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ABSTRACT

In 1993, the Colorado State Library published "The Impact of School Library Media Centers on Academic Achievement." This follow-up study focuses attention on the library media specialist and the services she or he provides throughout the building, rather than just the library media center as a specific place, and emphasizes the fact that better library media services lead to better student performance on standards-based tests. In addition to confirming and updating the findings of the first Colorado study, this project expands on the original study's results by measuring the impact on academic achievement of specific leadership and collaboration activities of library media specialists; principal and teacher engagement in library media programs; and information technology, particularly networked computers offering licensed databases and the Internet/World Wide Web. On all three counts, this study showed a positive impact. This study is put into perspective with past research as well as the American Association of School Librarians' new standards, "Information Power." It contains reports of the findings in a variety of readily usable formats, including: an executive summary, a brochure, and a brief report that includes similar studies completed recently for Alaska and Pennsylvania. Appendices include a bibliography; list of participants; sample survey form; the brochure; and a section of "Fast Facts" and PowerPoint slides. Includes 40 tables and 2 figures. (AEF)

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How School Librarians Help Kids Achieve Standards

The Second Colorado Study

Keith Curry Lance
Marcia J. Rodney
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How School Librarians Help Kids Achieve Standards

The Second Colorado Study

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Special thanks are also due to Marcia J. Rodney of the University of Denver's Library and Information Services Department, who did yeoman work during both the data processing and analysis stages of this study. She was responsible for matching data across many files, for "mining" community demographic data from several web sites, and for running and analyzing the results of many SPSS statistical procedures that yielded the accompanying tables. She also assisted in the design and production of the final document.

The review of the literature contained herein updates the comprehensive review done for the original Colorado study. Indeed, it was produced by one of that review's co-authors, Christine Hamilton-Pennell of the University of Denver's Library and Information Services Department and Mosaic Knowledge Works. In addition to updating her earlier effort with Lynda Welborn, she also did an excellent job of relating previous research on this topic to the themes of Information Power. This focus improves the organization and readability of the literature review and makes it more relevant to the current context of library media development.

For sidebar stories illustrating key findings of the study, we are indebted to Eugene Hainer, the State Library's Senior Consultant for School Library Media Development, and school library media programs participating in the Power Libraries project.

Last, but not least, thanks are due to both the Colorado State Library and the University of Denver Library and Information Services Department for their support of this research.

Keith Curry Lance
Denver, Colorado

Executive Summary

Colorado Student Assessment Program (CSAP) reading scores increase with increases in the following characteristics of library media (LM) programs: LM program development, information technology, teacher/library media specialist (LMS) collaboration, and individual visits to the library media center (LMC). In addition, as participation increases in leadership roles, so does collaboration between teachers and LMSs. The relationship between these factors and test scores is not explained away by other school or community conditions. (See Figures 1 and 2, pp. 10-11.)

Library Media Program Development

CSAP reading test scores increase with increases in:
- LMS hours per 100 students (7th grade),
- total staff hours per 100 students,
- print volumes per student,
- periodical subscriptions per 100 students,
- electronic reference titles per 100 students (7th grade), and
- library media expenditures per student.

Information Technology

Where networked computers link library media centers with classrooms, labs, and other instructional sites, students earn higher CSAP reading test scores. These higher scores are particularly linked to the numbers of computers enabling teachers and students to utilize:

- LMC resources, either within the LMC or networked to the LMC,
- licensed databases, and
- Internet/World Wide Web.

Collaboration

A central finding of this study is the importance of a collaborative approach to information literacy. Test scores rise in both elementary and middle schools as library media specialists and teachers work together. In addition, scores also increase with the amount of time library media specialists spend as in-service trainers of other teachers, acquainting them with the rapidly changing world of information.

Test scores increase as library media specialists spend more time:
- planning cooperatively with teachers (7th grade),
- identifying materials for teachers,
- teaching information literacy skills to students,
- providing in-service training to teachers, and
- managing a computer network through which the library media program reaches beyond its own walls to classrooms, labs, and offices (7th grade).

Flexible Scheduling

Students have greater freedom in middle school, and are often able to choose whether or not they visit their school's LMC and use the resources there or take them home. Choosing to visit the LMC as an individual, separate from a class visit, is also a strong indicator of higher test scores. Middle schools with high test scores tend to have LMCs that report a high number of individual visits to the LMC on a per student basis.

Indirect Effects

While not having a direct effect on test scores, leadership involvement on the part of the library media specialist (LMS) has a strong impact on whether or not the LMS is working closely with teachers and students. At both elementary and middle school levels, the more the LMS is involved in school and library media professional activities, the higher the level of collaboration. Collaboration, in turn, does have a direct impact on test scores.

Higher levels of collaboration result from:
- meeting regularly with school administration,
- serving on standards and curriculum committees,
- working with faculty at school-wide staff meetings, and
- meeting with library media staff at the building level.

At the elementary level, library media program development (levels of staffing, collections and expenditures) and technology are strong predictors of each other as well as of test scores. The seventh grade level sees a strong relationship between library media program development and flexible scheduling.

School & Community Differences

These predictors of academic achievement cannot be explained away by:

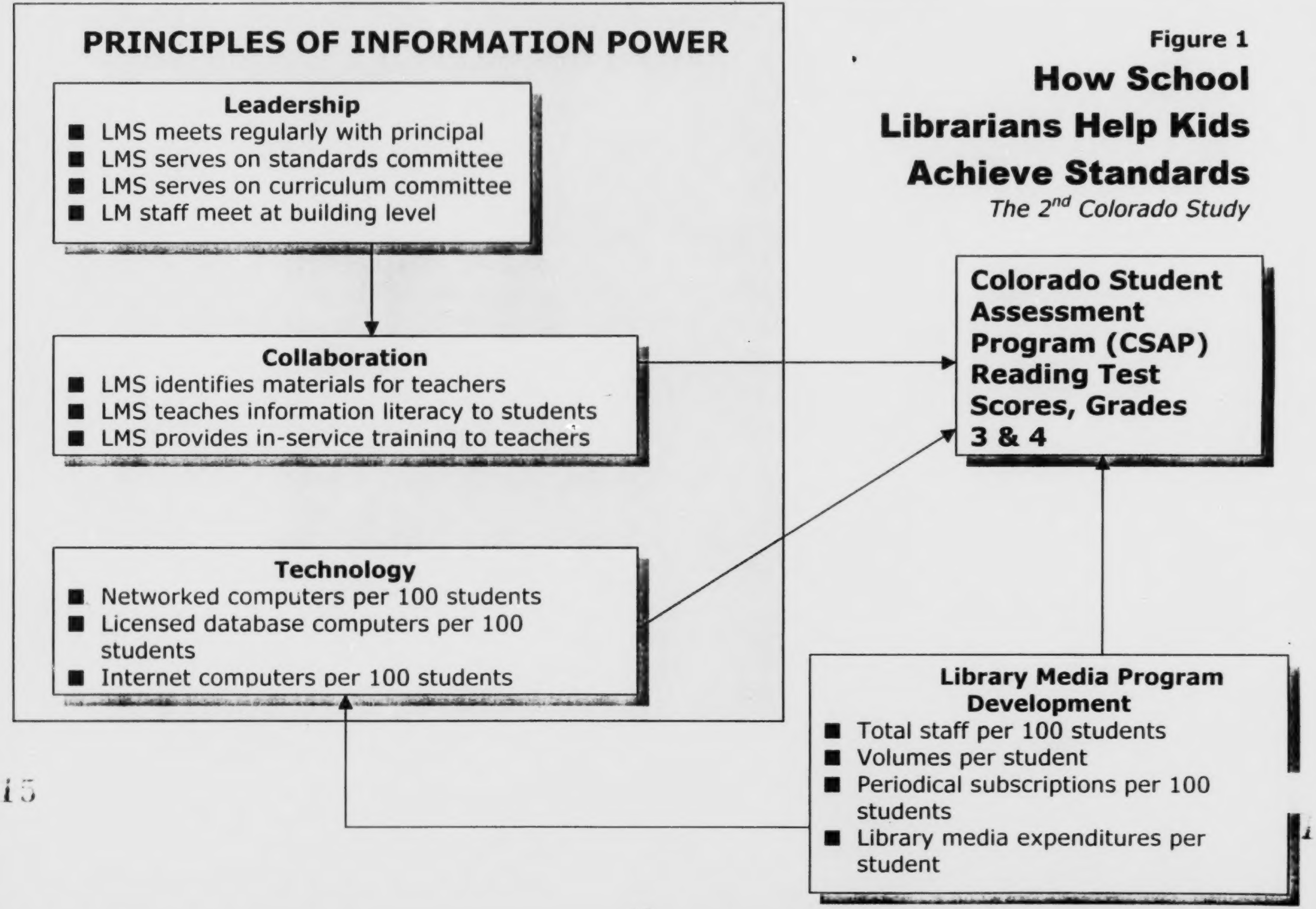
- school differences, including:
  - school district expenditures per pupil,
  - teacher/pupil ratio,
  - the average years of experience of classroom teachers, and
  - their average salaries; or
- community differences, including:
  - adult educational attainment,
  - children in poverty, and
  - racial/ethnic demographics.

How much will a school's test scores improve with specific improvements in its library media program? The answer depends on the library media (LM) program's current status, what it improves, and how much it is improved. When LM predictors are maximized (e.g., staffing, expenditures, and information resources and technology), CSAP reading scores tend to run 18 percent higher in fourth grade and 10 to 15 percent higher in seventh.

Figure 1

How School Librarians Help Kids Achieve Standards

The 2nd Colorado Study



PRINCIPLES OF INFORMATION POWER

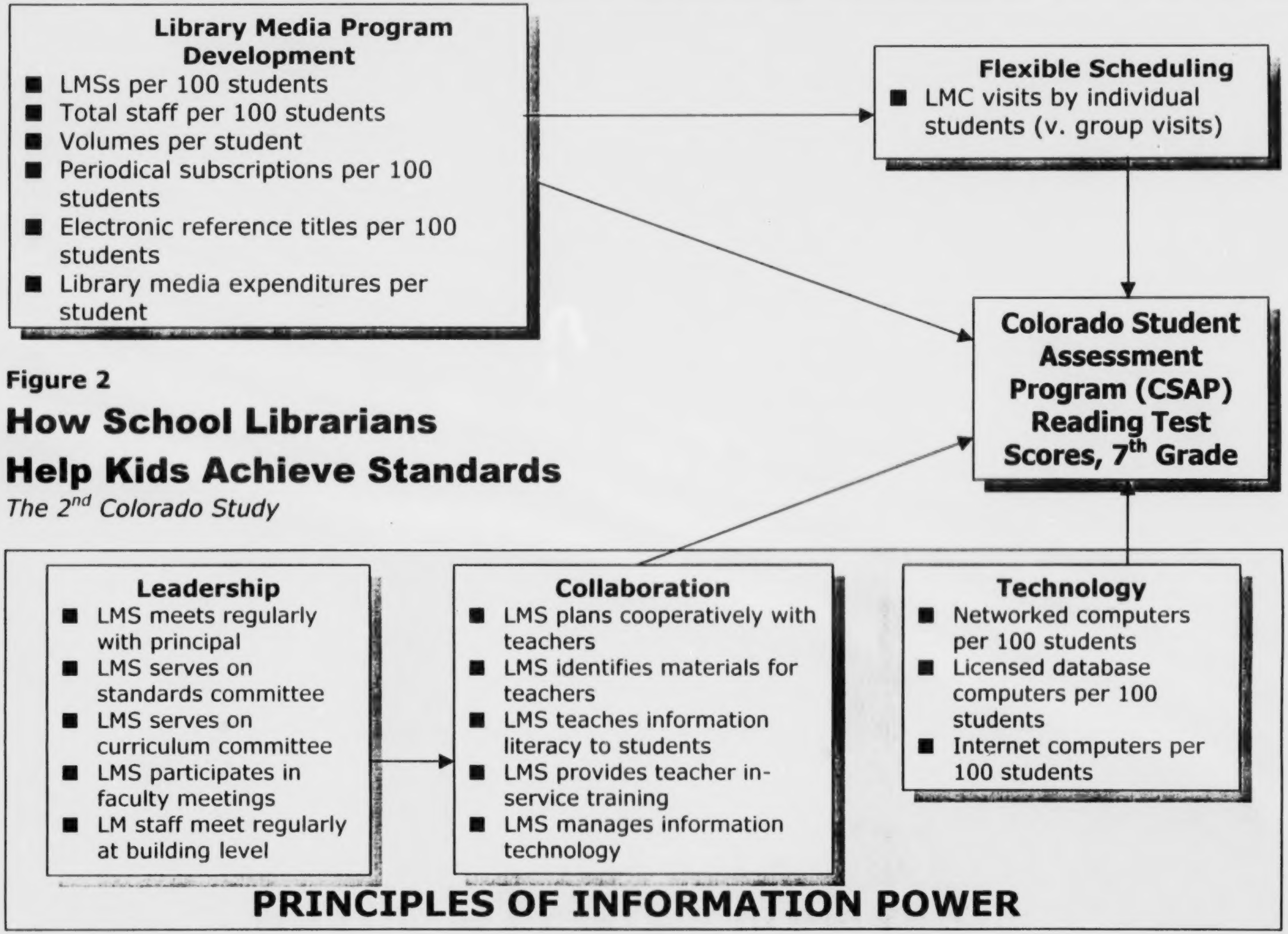
Leadership
- LMS meets regularly with principal
- LMS serves on standards committee
- LMS serves on curriculum committee
- LM staff meet at building level

Collaboration
- LMS identifies materials for teachers
- LMS teaches information literacy to students
- LMS provides in-service training to teachers

Technology
- Networked computers per 100 students
- Licensed database computers per 100 students
- Internet computers per 100 students

Colorado Student Assessment Program (CSAP) Reading Test Scores, Grades 3 & 4

Library Media Program Development
- Total staff per 100 students
- Volumes per student
- Periodical subscriptions per 100 students
- Library media expenditures per student



Library Media Program Development

- LMSs per 100 students
- Total staff per 100 students
- Volumes per student
- Periodical subscriptions per 100 students
- Electronic reference titles per 100 students
- Library media expenditures per student

Flexible Scheduling

- LMC visits by individual students (v. group visits)

Colorado Student Assessment Program (CSAP) Reading Test Scores, 7th Grade

Figure 2

How School Librarians Help Kids Achieve Standards

The 2nd Colorado Study

Leadership

- LMS meets regularly with principal
- LMS serves on standards committee
- LMS serves on curriculum committee
- LMS participates in faculty meetings
- LM staff meet regularly at building level

Collaboration

- LMS plans cooperatively with teachers
- LMS identifies materials for teachers
- LMS teaches information literacy to students
- LMS provides teacher in-service training
- LMS manages information technology

Technology

- Networked computers per 100 students
- Licensed database computers per 100 students
- Internet computers per 100 students

PRINCIPLES OF INFORMATION POWER

Introduction

In 1993, the Colorado State Library published **The Impact of School Library Media Centers on Academic Achievement** (CDE, 1992; Hi Willow, 1993).

The original "Colorado study" (as it became widely known) provided clear and compelling testimony on several points:

- It demonstrated statistically that quality library media programs—those with more professional library media specialist positions and larger and more diverse collections—lead to higher student test scores.
- It also demonstrated the positive effect on student test scores of library media specialists and classroom teachers working together.
- It ruled out the demographic and economic makeup of the school and the community as well as the teacher-pupil ratio as potential factors explaining away these relationships as something other than cause and effect.

The report on that study identified several potential next steps in library media research, for which the time was ripe:

- The Colorado study utilized reading scores from the Iowa Tests of Basic Skills (ITBS), a norm-referenced test used by about 200 Colorado schools which had also responded to a library media survey. All Colorado schools are now required to use the same standards-based test, and scores for the first cohort of students (i.e., all Colorado fourth graders) are already available. This new study asks whether or not the original findings still hold true, when using a different kind of test as the indicator of academic achievement.
- While some effort was made in the original study to demonstrate the important role of technology in library media programs, data available at that time was minimal and not adequate to the task. Now, a great deal more data is available on this role. Because technology continues to place great demands on the fiscal and human resources of schools—especially school libraries—it must demonstrate its value to be funded.
- While the earlier study demonstrated the value of library media specialists and classroom teachers working together in general, it did not identify particular types of collaboration most likely to help students meet academic standards. If library media specialists are to act on the findings of such research, it must yield specific, proven, replicable strategies for collaboration.

For these three reasons, a replication and follow-up study based on the first Colorado study seemed warranted. The title of this new study, **How School Librarians Help Kids Achieve Standards**, reflects two new perspectives that helped to shape this project and distinguish it from its predecessor: First, it focuses attention on the library media specialist and the services she or he provides throughout the building, rather than just the library media center as a specific place. Second, it emphasizes the fact that better library media services lead to better student performance on standards-based tests.

In addition to confirming and updating the findings of the first Colorado study, this project expands on the original study's results by measuring the impact on academic achievement of:

- specific leadership and collaboration activities of library media specialists (LMSs),
- principal and teacher engagement in LM programs, and
- information technology, particularly networked computers offering licensed databases and the Internet/World Wide Web.

On all three of those counts, this Colorado study showed a positive impact. This document reports comprehensively on the project, putting it into perspective with past research as well as the American Association of School Librarians' new standards, **Information Power**. It also contains reports of the findings in a variety of readily useful formats, including: an executive summary, a brochure, and a brief report that also includes similar studies completed recently for Alaska and Pennsylvania.

The new study reported herein was conducted by the Library Research Service, a unit of the Colorado State Library and the Colorado Department of Education, and the University of Denver's Library and Information Services Department. Keith Curry Lance, Ph.D., Director of the LRS and principal investigator for the original Colorado study, led the study team. The team also included University of Denver Master of Library and Information Services student Marcia J. Rodney and Christine Hamilton-Pennell, owner/consultant of Mosaic Knowledge Works as well as a D.U. faculty member.

Review of the Literature

This study aims to replicate and expand upon previous research showing a link between student academic achievement and the school library media program. With the move to standards-based education, which focuses on what students have learned (proficiencies or outcomes) rather than what is taught (coverage of content), the school library media specialist is in a unique position to help students develop the information literacy skills which will enable them to achieve standards.

The new edition of **Information Power: Building Partnerships for Learning** (ALA, 1998), reflects a change in emphasis for school library media programs, from providing resources to students to creating a community of lifelong learners. Three overlapping roles are identified for school library media specialists (LMSs) in this document. The *learning and teaching* role supports the instructional goals of the school in both content (standards and subject curriculum) and process (information literacy skills). The *information access and delivery* role encompasses the more traditional responsibilities of the LMS, those of developing the media center's collection and services and providing access to them. A third role, *program administration*, includes both management of the program and larger training and advocacy functions within the school community.

This review of the research organizes the research findings under the three roles identified for the LMS in **Information Power** (1998). Many of the research studies were conducted in the context of the earlier guidelines, **Information Power: Guidelines for School Library Media Programs** (ALA, 1988). Although some of the goals in the document have changed, the underlying mission statement remains the same:

> The mission of the library media program is to ensure that students and staff are effective users of ideas and information. This mission is accomplished:

- by providing intellectual and physical access to materials in all formats
- by providing instruction to foster competence and stimulate interest in reading, viewing, and using information and ideas
- by working with other educators to design learning strategies to meet the needs of individual students. (ALA, 1998, p. 1)

Presence of a Library Media Center with a Professional Library Media Specialist

Many studies conducted before the advent of the **Information Power Guidelines** dealt with the value of the mere presence of a library with a professional librarian, reflecting the lack of centralized library service, particularly at the elementary level. Willson (1965) showed that students demonstrated superior gains on the Iowa Test of Basic Skills (ITBS) in elementary schools with a centralized library and a professional librarian. Likewise, Becker (1970) compared ITBS scores between students in elementary schools with and without libraries and found that the presence of a library and the guidance and function of a librarian appeared to exert significant influence on pupil achievement in some information-gathering skills areas.

In the study by Hale (1969), SAT scores improved among students receiving library service from a professional. McMillen (1965) found that students in schools with good libraries and full-time librarians performed at higher levels in reading comprehension and in knowledge and use of reference materials than students in schools with minimal or no library service. Didier (1982) confirmed that student achievement in reading, study skills and use of newspapers was significantly greater at the seventh grade level in schools with professional library media personnel as compared to schools without them. Student access to the library media center was also significantly greater in schools with professional library media personnel than in schools without them.

Yarling (1968) found that the addition of a well-equipped and managed centralized library had a significant impact on the performance of elementary school students in library-related skills, particularly outlining and note taking. Students who used a new fully staffed and equipped elementary school library also showed significant improvement in library skills test scores in the study by Ainsworth (1969). McConnaha (1972) found that the library skills test scores of high school students who had attended an elementary school with both a library and a librarian who conducted a strong library skills program were significantly higher than those of students who did not have these advantages.

Learning and Teaching

Some research studies before the advent of **Information Power Guidelines** in 1988 referred to various aspects of the LMS's teaching role. Aaron (1975) studied a group of eighth grade students who participated in a program in which a full-time media specialist was added to the teaching team. In addition to showing significant improvement in language arts, spelling, and math computation, the students in the experimental group experienced improvement in their self-concept. Bailey (1970) studied a group of disadvantaged first-grade students who participated in a library resource program over a 12-week period. The experimental group showed a significant increase in total language ability and the ability to express ideas over the control group of disadvantaged students who received no special treatment. DeBlauw (1973) examined the rate of cognitive growth of students on achievement test batteries before and after implementation of a multi-media program. Elementary students showed significant gains, but the academic performance of high school students was unchanged by the program. A longer-term study of twelfth grade English students by Gilliland (1986) found that test scores on the study-locational portion of the California Assessment Program improved during the years following implementation of a library review program.

Gengler (1965) looked at differences in the ability to apply selected problem solving skills between sixth grade students who were instructed by a classroom teacher and those who received additional instruction from an elementary school librarian. Findings showed that the mean score on a problem solving skills examination for the librarian-teacher instructed group was significantly higher than for the teacher instructed group. Hastings and Tanner (1963) looked at whether improved English language skills could be developed at the tenth-grade level through systematic library experiences rather than the traditional emphasis on formal English grammar. The group that eliminated all traditional emphasis on formal grammar and spelling and instead received systematic work in the use of library references was significantly superior to the groups that emphasized traditional work in grammar and spelling.

In a study by Hutchinson (1982), English teachers gave tenth-grade students special library skills instruction and practice over a two-week period. Library usage among the students increased regardless of their academic grade point averages. Hale (1970) found that an experimental group of twelfth grade students who were given a variety of library services and resources and the opportunity to work independently under the supervision of the librarian showed "remarkable enthusiasm" for learning. Barrilleaux (1965) focused on a comparison of the achievement of junior high school students in general science classes in which textbooks were used with students who used reference materials in the school library rather than a textbook. Results showed that for all investigated educational outcomes, the use of library materials without a basic textbook was the superior method of instruction.

Much of the research taking place after the introduction of the **Information Power Guidelines** in 1988 focuses on the instructional role of the school library media specialist. Lance, Welborn and Hamilton-Pennell (1993) found that students whose library media specialists played an instructional role, either by identifying materials to be used with teacher-planned instructional units or by collaborating with teachers in planning instructional units, tended to achieve higher reading scores. A study by the Library Research Service in Colorado (1998a) also found that students earned higher reading scores in schools where the LMS played a vital instructional role, including planning instruction with teachers, providing information literacy instruction, providing in-service training for teachers, and evaluating students' work.

Nevertheless, several researchers have identified a gap between theory and practice. Person (1993) found a discrepancy between the real and ideal role perceptions of LMSs. While they were aware of the roles identified in the **Guidelines**, they didn't perform them as often as they would have liked. Pickard (1993) also studied the gap between theory and practice of LMSs performing the instructional role and found that less than 10 percent of her sample appeared to be practicing the role to a great extent. Angelo (1994) verified this finding in a study which showed that the majority of LMSs were performing duties of the traditional librarian, such as student orientation and assisting students and teachers in finding materials, while a low percentage were performing planning and consultation roles. Kuhne (1993) concluded that school libraries need to be more integrated into the curriculum and that the school librarian could play a much more distinctive teacher role than he or she does today. Van Deusen and Tallman (1994) found that more than half of their sample of LMSs did not assess student work at all during the study period. McCarthy (1997) studied LMSs who were "well above average" in the New England region and found that 58 percent of them believed that implementation of **Information Power Guidelines** was only somewhat realizable or not realizable at all.

Barriers to LMSs practicing the instructional role include the attitudes of both the LMSs and teachers, as well as program limitations such as fixed scheduling and lack of technology. Lai (1995) found no significant differences between teachers' and media specialists' attitudes regarding the LMS's role in curriculum development, instructional development and technology use. Both groups believed the LMS had only a marginal role in designing and producing materials for units. Giorgis (1994) discovered that the majority of elementary school teachers perceived the LMS as a resource person and only a few as a collaborator. Nevertheless, during the course of her study Giorgis found that these views changed. Through flexible scheduling and collaborative planning, the perceptions of classroom teachers, administrators, children and parents of the LMS's role became one of teacher and collaborator.

Other researchers also attest to the positive effects of moving to flexible scheduling. Bishop (1992) found that the most significant changes in the role of the LMS occurred with the move to flexible scheduling and curriculum-integrated instruction. Fedora (1993) compared two exemplary school library media centers, one with fixed and one with flexible scheduling and found that the LMS participated more often in planning with teachers and as an instructional consultant in the flexibly-scheduled program. Van Deusen (1993) and van Deusen and Tallman (1994) found that LMSs in schools that combined both flexible scheduling and team planning had significantly more curriculum involvement.

Technology can also support the instructional role. Everhart (1992) found that high school library media specialists with automated circulation systems spent significantly more time in instructional development and use of technology than those without automated systems, although the actual time spent in development of the educational program was quite low. Van Deusen (1996a) found that both flexible scheduling and library automation were positively related to the LMS performing an instructional consultation role, as well as providing electronic support for teachers using technology, providing individual assistance to students, and reducing the amount of time spent on clerical duties. Jones (1994) concluded that technology expands the teacher-librarian partnership possibilities in literature-based instruction.

The most important factor in successfully implementing the instructional role is the characteristics and skills of the school library media specialist himself or herself. Yetter (1994) found that LMSs successfully involved in resource-based learning were energetic, healthy and enthusiastic; showed leadership abilities; had theoretical understanding of resource-based learning; had the ability to translate theory into effective instructional plans; and were knowledgeable about specific learning resources. These LMSs saw teaching as their primary function. As a result, the colleagues of these LMSs saw them as vital participants in the instructional process. Farwell (1998) found that LMSs could play a pivotal role in the successful implementation of collaborative planning if they were knowledgeable about the curriculum, the library collection, information literacy instruction, and instructional design and delivery. They also needed to have good interpersonal skills and be willing to act as change agents. Van Deusen's (1996b) case study of a school library media specialist involved in an instructional planning process showed that she contributed as a peer and helped to clarify, initiate, summarize and test the discussion ideas.

K. G. Alexander (1992) studied four exemplary LMSs and found that they fulfilled most of the aspects of the instructional role. They spent large portions of each day giving instruction, effectively managed class and teaching time, provided instruction related to the curriculum, and used innovative instructional methods. They also instructed different sections of the school community, ensured that their media center had resources to support the changing curriculum, and assisted teachers in planning classroom instruction. Gehlken (1994) studied the school library media programs in three blue ribbon high schools and came to similar conclusions. In all three schools, there was a cooperative relationship between the LMS and the faculty, with opportunities for collaborative planning and integrating information skills into the classroom curriculum. The students in all three schools overwhelmingly indicated that the most important service provided by the school library media program was help from the LMS in finding and evaluating information. Bell and Totten (1992) found that teachers employed in academically successful schools tended to choose the library media specialist significantly more for cooperation on instructional problems than did teachers serving in academically unsuccessful elementary schools.

Another aspect of the LMS's learning and teaching role identified in **Information Power** (1998) is to encourage and engage students in reading, viewing, and listening for understanding and enjoyment. Yetter (1994) found that LMSs involved in resource-based learning were enthusiastic about reading and books. Lai (1995) found that teachers and LMSs both strongly agreed that the LMS should work with teachers in helping students to develop the habit of reading.

In Australia, Todd, Lamb and McNicholas (1993) studied Year-Seven and Year-Eleven students and found that integrating information skills into subject content, with collaboration by classroom teachers and LMSs, had a positive impact on student learning, including better understanding of subject content and improved test scores. Todd (1995) analyzed the impact of integrated information skills instruction in a Year-Seven science class. The two treatment classes recorded significantly higher annual science scores than the control classes.

The adoption of state content standards and the movement towards standards-based instruction and assessment is too recent to have a substantial research base as yet. N. A. Alexander (1998) determined that standards policy is generally associated with improved student performance, although there are disturbing equity issues. In the school library field, a few research studies to date have looked at the connection between integrating information literacy skills into the curriculum and improved student learning. Grover and Lakin (1998) reported on the development and testing of a Kansas model which integrates information skills into planning and assessing learning across the curriculum. Teachers and librarians who participated in the study indicated that the model facilitated student learning in all grade levels studied and for units of any length. The "integrated assignment" stage of the model was reported as a key to enhancing student learning.

In regard to standards-based education, one of the more interesting developments of the past decade has been the elaboration and proliferation of the value-added assessment model originated in Tennessee by Sanders, et. al. (1997). This model is being considered in Colorado and other states as a method for evaluating the performance of both schools and teachers. In the author's most authoritative account to date, he reports that the strongest predictor of year-to-year improvement in students' test scores is teacher quality. To date, however, there have been no further reports from Sanders or others defining precisely what "teacher quality" means in empirical terms. Decades of library media research findings indicate that one major factor that has demonstrated consistently a positive, strong, and statistically significant relationship to quality teaching is a close working relationship between the classroom teacher and the library media specialist.

Information Access and Delivery

The information access and delivery role includes providing quality resources and technology that support the curriculum, offering convenient and flexible access to the media center's resources and services, and providing a welcoming environment that is conducive to learning. Early studies focused on service level and collection size as predictors of academic achievement. Greve (1974) discovered that the most valuable predictor of student test scores was the number of volumes in the school library. Thorne (1967) examined the reading comprehension and library skills of students using the augmented services of a Knapp Project library versus the nominal services of a second junior high school library in a two-year study. Findings revealed a significant difference in the mean gains of the experimental group over the control group in reading comprehension and library skills.

More recent studies have focused on the connection between students' achievement in reading and access to print resources, particularly in libraries. The Colorado study by Lance, Welborn and Hamilton-Pennell (1993) concluded that the size of a media center's staff and collection is the best school predictor of academic achievement. In that study, academic achievement was represented by reading scores, which were highly correlated with scores in other areas, such as writing and research skills. Elley (1994, 1996) compared the scores of students from 32 countries on the 1992 International Association for the Evaluation of Educational Achievements (IEA) Reading Literacy Study with data on the home environment and school and public libraries. He concluded that access to print, and especially the size of the school library, was the strongest predictor of reading achievement. Froese (1997) compared the IEA reading scores for British Columbia with variables related to school and classroom libraries and found that students who have the opportunity to borrow books from libraries have a considerable achievement advantage over those who cannot.

In his meta-analysis of reading research studies, Krashen (1993) concluded that more free voluntary reading results in better reading comprehension, writing style, vocabulary, spelling and grammatical development. He also determined that when books are readily available and the print environment is rich, more reading is done. Even second-language learners will be more successful in language acquisition when they read more in the second language. Children get a substantial percentage of their books--from 30 to 90 percent--from school, classroom and public libraries. They also read more when they have a comfortable, quiet place to read, such as the school library. Ramos and Krashen (1998) concluded that simply providing interesting books to children is a powerful incentive for reading, perhaps the most powerful incentive possible.

McQuillan (1997) drew similar conclusions. He found that access to print via the home, school and public library, and frequency of free reading accounted for nearly 80 percent of the variance in fourth grade reading test scores. He also reported a correlation between school and public library quality, library use, and amount of reading done by school children. In McQuillan's (1998) meta-analysis of literacy studies, there was considerable evidence that the amount and quality of students' access to reading materials is substantively related to the amount of reading they engage in, which in turn is the most significant determinant of reading achievement. More reading leads to better reading achievement.

Other researchers have also demonstrated a relationship between free voluntary reading and academic achievement. Digiovanna (1994) found that the amount of recreational reading was positively correlated with higher academic achievement levels for third, fifth, and seventh graders. Halliwell (1995) demonstrated a relationship between eighth graders' self-perceptions of being free voluntary readers and the degree of their success on the Missouri Writing Assessment. Lipscomb (1993) reported on the self-selected recreational reading of first through third-graders over a nine-week period in the summer and found that the total number of words read was a significant predictor of students' overall reading achievement and word recognition.

Access to print through public libraries has been shown to contribute to students' academic achievement. A Library Research Service study (no. 153, 1998) reported that in Colorado school districts scoring in the highest third on the 1997 Colorado State Assessment reading test, circulation of children's materials per capita by public libraries was 50 percent higher than in school districts scoring in the lowest. There were similar results for states scoring highest on the NAEP reading test. Ramos and Krashen (1998) reported that even one classroom trip per month to the public library had a positive impact on students' reading. McQuillan (1997) found that SAT scores were positively correlated with per capita public library circulation. A Library Research Service study (no. 150, 1998) reported that students are likely to earn higher reading scores if there is a relationship between the library media program and local public libraries. Such a relationship might include public library staff presenting booktalks at the school library, and the local public library providing a summer reading program.

Several researchers point to the potential importance of the school library as a factor in equalizing access to print resources for disadvantaged children. McQuillan (1997, 1998) found a strong negative correlation between poverty and print resources at home. He concluded that school and public libraries could help increase access to print for low-income communities and schools, thus improving their students' reading achievement. Halle, Kurtz-Costes and Mahoney (1997) reported that the number of books in the homes of low-income, African-American children was related to children's reading scores at the end of the following year. They concluded that providing access to children's books through libraries may be one of the most important things disadvantaged communities and schools can do. McQuillan (1998a) studied the public library use of language minority students and found that Spanish-speaking households are much less likely to have access to books, and, therefore, fewer opportunities to further literacy development. He concludes that both public and school libraries must make concerted efforts to reach out to language minority parents and their children.

Unfortunately, school libraries often appear to reflect the economic conditions of their communities. Krashen and O'Brian (1996) reported that socio-economic status was the most powerful predictor of student reading achievement in the Los Angeles Unified School District. Both Krashen (1996) and McQuillan (1998) made the point that the low student reading scores in California could be traced to the deplorable state of its school and public libraries. Allington, Guice, Baker, Michelson, and Li (1995) studied the variations in access to books in school libraries in twelve high- and low-income neighborhoods. They discovered that high-income schools had 21.5 books per student, whereas the low-income schools had 15.4 volumes. They also discovered disparities in number of magazine subscriptions, size of classroom libraries and access policies. McQuillan, LeMoine, Brandlin and O'Brian (1997) studied access to school libraries and found that students in high-achieving schools serving largely middle-class children provided greater access to books, more time to read in school, and more liberal circulation policies than those from lower-achieving schools in largely low-income neighborhoods. Smith, Constantino and Krashen (1996) found, not surprisingly, that school libraries in high income communities such as Beverly Hills had around three times as many books per student as school libraries in low-income communities such as Compton and Watts. Public libraries in high-income communities also had about twice as many books as those in low-income communities.

Size of the school library collection has been shown to be a positive predictor of student academic achievement (Greve, 1974; Lance, Welborn and Hamilton-Pennell, 1993; Elley, 1996). Krashen (1995) found that a significant predictor of NAEP reading comprehension test scores was the number of books per student in school library media centers. Similarly, McQuillan (1997) reported that SAT scores were positively correlated with the number of books per student in the school library. Krashen and O'Brian (1996) did not find a significant relationship between books per student and student achievement in the Los Angeles Unified School District. They concluded that the number of books in a school library has little effect on literacy if access to them is restricted, the books are badly out of date, and students do not know where they are, as is the case in many California school libraries.

Frequency of library use has also been positively linked to student achievement scores. Koga and Harada (1989) investigated the attitudes of students in Australia, Japan, Korea and Thailand towards school libraries and found that students with a keen attitude toward learning tended to use the library more often and demonstrated better academic achievement. JoAnn Everett, a librarian in a Library Power elementary school in Chattanooga (noted in "Positive Correlation...", 1999) found a direct relationship between the number of times students had been in the library and the level of their test scores in reading comprehension and reference skills. A Library Research Service report (no. 149, 1998) showed that states with above average reading scores on the 1994 NAEP reading test have schools where students visit the school library media center more frequently and borrow more books and other materials.

Flexible scheduling appears to support more frequent library use by individual students. Fedora (1993) found that in a flexibly scheduled library media program, students have more frequent access individually and in small groups than in a fixed-schedule program, where nonscheduled use is rare. Van Deusen (1996b) reported that instances of the LMS providing individual assistance to students was higher in flexible than fixed schedule situations.

The role of the LMS in developing and providing access to the library media program has received a fair amount of attention in the research. Pembroke (1997) found that, when school librarians provide reading guidance or a bibliography, reluctant fifth grade readers can be motivated. Other motivating factors included access to the library and books; an adequate collection of print and non-print materials; and an inviting environment. Martin (1996) found that as library services increased (including reference, information skills, curriculum integration, interlibrary loan, reading guidance, and technical assistance), third grade test scores also increased. She found a statistically significant relationship among all the library media center variables (collection size, expenditures for the collection, staffing, and services) and overall achievement in grades 3, 5, and 11, indicating that the whole is greater than the sum of its parts. A Library Research Service study (no. 150, 1998) reported that students are likely to earn higher reading scores if there is a collection development policy for the school library media center.

K. G. Alexander's (1992) study of four exemplary media specialists found that they all provided continuous access to their media centers; assisted individual users; designed flexible circulation policies; used innovative methods to promote their media centers; and developed media center collections which supported all areas of the curriculum. Gehlken (1994) reported that in all three blue ribbon high schools studied, the LMS flexibly scheduled classes; organized and cataloged the collection; provided an inviting climate conducive to learning; assisted students in traditional and electronic methods of information access; and involved faculty in the selection of materials. The media centers in all three schools were organized, automated, easily accessible, and provided materials in a variety of formats across all levels and subject areas. The media center facilities were inviting, aesthetically pleasing, safe, and user-friendly.

The role of technology in promoting student achievement has been the focus of some recent studies. In their review of educational technology research, Sivin-Kachala, Bialo, and Langford (1997) concluded that using technology has a positive effect on student achievement, attitudes toward learning, and student self-concept. Paul, VanderZee, Rue and Swanson (1996) reported that using the Accelerated Reader technology-based literacy program had a positive affect on student academic performance and attendance rates, especially for socio-economically disadvantaged children in urban areas. Wenglinsky (1998) found a positive correlation between computer use and academic achievement in mathematics, but only if computers were used to convey higher-order skills or engage in learning games. Use of computers for drill and practice, the lower-order skills, was negatively related to academic achievement for both fourth and eighth grade students. Significantly, disadvantaged groups had less access to those aspects of technology that positively affected educational outcomes.

There is perhaps no place where the library media specialist's role has changed more in the last ten years than in the integration of technology. Nevertheless, access to technology in school library media centers still varies widely. Powell's (1998) survey of 300 elementary and secondary school library media centers in Tennessee revealed a wide variability in technology access. McCarthy (1997) found that less than 50 percent of the New England school library media centers in her sample had automated circulation and cataloging systems, and these were mostly in middle and high school libraries.

High-achieving schools tend to have more technological resources. Baule (1997) found that schools with exemplary technology were also more likely to have high-quality school library media programs. Yetter (1994) observed that the library media centers in successful resource-based learning schools had modern, spacious facilities designed for flexible use and access to technology. Gehlken (1994) noted that all three blue ribbon schools studied had library media centers which were committed to increasing student access to technology, and which had the flexibility and electronic capabilities to accommodate the changing needs created by new technologies. Students identified the electronic catalog, computer printer workstations and copying machines as some of the most important services provided by the library media program.

As Wenglinksy (1998) demonstrated, it is not the amount of technology or computer use that counts in promoting student achievement, but how it is used. Many researchers (for example, McQuillan, 1996; Lance, Welborn and Hamilton-Pennell, 1993) have found no correlation between reading achievement and amount of computer software available. Technology must be integrated into the school library media program. A Library Research Service report (no. 141, 1998) concluded that students earn higher reading scores if their school library media programs incorporate the latest information technology. Such technology includes a district-wide catalog, access to online databases, resources available through a local-area network, and access to the World Wide Web and the statewide library network. Person (1993) reports that LMSs don't see a separate, organized technological media role for themselves, but see technology as a means to accomplish the goals and missions of the media center program as expounded in **Information Power** (1988).

Program Administration

The program administration role involves effective management of the human, financial and physical resources of the library media program. This role also provides leadership within the larger learning community. Adequate staffing, budget, and administrative support are key to the success of this role. Yetter (1994) found that schools that had successfully implemented resource-based learning had a common understanding and support from the principal, teaching faculty and library media specialist about the centrality of the library media program in the school's instructional process. These schools provided planning time for teachers and library media specialists to work collaboratively, clerical support for the LMS, flexible scheduling in the library media center, and principal support of the library media program. Likewise, Farwell (1998) determined that in schools with successful collaborative planning, the principal served as an advocate for collaborative planning and information literacy instruction, and provided financial support for the library media program, adequate clerical staff, and time during the school day for LMSs and classroom teachers to plan together. Gehlken (1994) reported that in all three blue ribbon high schools, the principals actively supported and promoted the library media program. Standridge (1996) reported that student achievement in urban elementary schools was positively impacted by greater participation of the certified staff in school-based decision making, especially in the areas of goals, vision, mission, and curriculum and instruction.

There appears to be a two-way relationship between administrative support and LMSs performing the instructional role. In schools where there was fiscal and organizational support for the library media program, including automated systems and paid support staff, van Deusen (1996a) found that

LMSs performed the instructional consultation role to a greater extent. Lumley (1994) concluded that instituting a curricularly integrated and flexibly scheduled library media program required leadership on the part of the library media specialist as well as principal support, resulting in strong leadership roles for the LMS in curriculum, instruction and staff development. Van Deusen (1996a) reports that the availability of support staff and automated library systems was positively related to LMSs' doing more consulting work with teachers and spending less time on nonprofessional tasks.

Lance, Welborn and Hamilton-Pennell (1993) found that library media centers which have more endorsed staff tend to have staff who spend more time identifying materials for instructional units developed by teachers and more time collaborating with teachers in developing such units. They found that as the LMS's instructional role increases, the size of the library media center's staff and collection increases, which, in turn, is a direct predictor of student reading achievement. Martin (1996) also found a significant positive relationship between school library media center staffing and student achievement, especially in high school reading. Schools employing more media center staff had higher achievement test scores. A Library Research Service study (no. 141, 1998) showed that student reading scores were higher in schools where there is a state-endorsed library media specialist and where the LMS is supported by an aide.

School library media specialists in effective schools tend to have good planning, communication and management skills. Yetter (1994) observed that library media specialists in successful learning-based schools were expert in developing effective library media programs which were congruent with the state and national **Information Power** (1988) guidelines. The basic library procedures and processes in their library media programs functioned smoothly. A Library Research Service report (no. 150, 1998) indicated that students are likely to earn higher reading scores if there is a plan for the development of their school library media program. Gehlken (1994) reported that in all three blue ribbon high schools the LMSs took proactive steps to update students, teachers and administrators about new materials, technology, and services. Lumley (1994) concluded that instituting a curricularly integrated and flexibly scheduled library media program in an elementary school required LMS leadership in site-based staff development and good communication with staff and principal support. The involvement of a school library media specialist in technology-based staff training can support student achievement. Wenglinsky (1998) found that teacher's professional development in technology and the use of computers to teach higher-order skills were both positively related to academic achievement in mathematics and the social environment of the school.

A very important administrative role for the LMS is to obtain an adequate budget for the library media program. Angelo's (1994) study of Massachusetts school library media programs revealed that more than 90 percent were operating at the minimum level according to state standards in the areas of personnel, collection, and budget. Lance, Welborn and Hamilton-Pennell (1993) found that students at schools with better funded library media centers tend to achieve higher average test scores, whether their schools and communities are rich or poor and whether adults in the community are well or poorly educated. Bruning (1994) also reported a positive relationship between student achievement measures and the proportion of a school district's budget spent on library materials, for both high- and low-income districts.

These findings are particularly significant since studies seeking a relationship between school spending as a whole and student performance have shown mixed results. Krashen (1995) found that expenditures for education did not affect reading comprehension scores, while Powell and Steelman (1996) did find that school spending was positively linked to state SAT and ACT performance. A review of over 400 studies of student achievement by Hanushek (1997) demonstrated that there is not a strong or consistent relationship between student performance and school resources after variations in family input are taken into account. Hedges, et. al. (1994) in their meta-analysis of studies of differential school inputs on student outcomes, show that a positive relationship between resources and educational outcomes does exist and is significant enough to be of practical importance. While there is no clear mandate for increasing school spending in general to support student achievement, the research does show that increasing expenditures for school library media materials has a positive effect.

Summary

The impact of school library media programs on academic achievement is well documented in the research literature. Studies demonstrate consistently that well-equipped, quality school library media centers that have professional staff involved in instruction contribute to the academic success of their students. Likewise, both higher order uses of technology and expenditures for library materials support student achievement. All three roles of the school library media specialist identified in **Information Power** (1998) lead to greater integration of the school library media program into the larger learning community and promote greater student achievement.

Methodologies

Sample

Colorado has almost 900 public schools serving grade four and over 400 serving grade seven. Of the schools serving fourth grade, 124—14 percent—participated in this study. Of those serving seventh grade, 76—19 percent—are included. Both grades are served by 56 of these schools. (See Table 1.)

Throughout this study, the participants were treated as two distinct samples, one for each tested grade. The following table reports the number in the sample for each grade and its proportion of the universe of all schools serving that grade.

Table 1. Comparison of the Study Sample and the Universe of All Colorado Public Schools Serving Grades 4 and 7 1998/99

Grade	Number in sample	Number in Universe	Sample as percent of universe
4th	124	874	14%
7th	76	408	19%

Survey

The survey of library media (LM) programs focused on several sets of potential predictors of academic achievement. These included: LMC hours, LM staff and their activities, technology, LMC usage, LM resource collections, and finances.

Respondent Information

The questionnaire began with several items identifying the responding school—its name and address, grades served, and its school district—and the individual respondent—his/her name and title as well as telephone and fax numbers and e-mail address. All of this information was required to assess and address potential deficiencies in the initial response rate to the survey. The grades served were especially important as they made it possible to determine which tested grades (fourth or seventh) a school included.

Hours of the Library Media Center

The second part of the questionnaire contained items concerning the library media center's hours of operations—both during and after school in a typical school week and in a typical week during summer months. It is expected that schools with higher test scores will be those with libraries that have longer hours.

Library Media Staff

This part of the questionnaire contained items requesting the numbers of people and total person-hours worked by paid staff with different types of qualifications. In addition, numbers of volunteers—both adult and student—and numbers of hours worked by them were collected. As noted earlier, one of the most consistent findings of research about the impact of library media centers is the value of staffing them with individuals who are professionally trained for the job. Another consistent finding in past research is the importance of having support staff who free the professional to do his/her job.

Paid Staff Activities

Perhaps the most fundamental question examined by this study was the value of staffing library media centers with trained individuals who engage in particular professional-level activities. The synergy of these activities, proved to have considerable impact on test scores. While the original Colorado study found strong evidence for the importance of the library media specialist's instructional role, those findings were based on just two items—the number of hours library media staff spent identifying and providing materials for instructional units developed by teachers and planning instructional units with teachers. The 1999 Colorado questionnaire included a much more comprehensive list of staff activities. Additional activities on this list included, among others, hours per typical week staff spent: providing library/information literacy instruction to individuals or groups; providing in-service training to teachers and other staff; and teaching collaboratively with faculty. The rationale for asking practitioners to parse their time so many ways was to obtain more specific insights about exactly what it is that library media specialists do that makes a difference in how students perform on achievement tests. Despite an absence of research at this level of detail, it seemed reasonable to expect that some activities would be more effective than others and that their effectiveness might vary for elementary and secondary levels.

Library Media Technology

A great deal of detailed information about library media technology was collected by the next section of the questionnaire. Respondents were asked to identify numbers of school computers both in or under the jurisdiction of the LMC and elsewhere in the school from which networked library resources may be accessed. Of those numbers, they were further asked to identify numbers of computers meeting various descriptions (e.g., with access to the library catalog, with a access to licensed databases, with access to the World Wide Web).

Additional questions addressed processor and connection speed, conditions of Internet access, and Internet filtering policies.

Usage of Library Media Services

The next part of the questionnaire solicited statistics about how often students and staff (i.e., administrators, teachers, others) interacted with library media center staff for different purposes: library/information literacy instruction; planning; etc. This section also included items for circulation of library materials as well as counts of materials loaned to other libraries and obtained from outside the library (e.g., interlibrary loans, intra-district loans). Previous research and conventional wisdom indicate that library media specialists who impact student performance are those who are most actively engaged with teachers and students alike, particularly more direct involvement in teaching and learning activities. Evidence from previous research also supports the assumption that students who read more—both for school purposes and voluntarily—do better on tests.

Library Media Resources

Despite the increasingly critical role played by library media staff in the instructional process, what most people think of first when the school library is mentioned is its collection. This section of the questionnaire solicits an inventory of the collection by format, including traditional print sources (e.g., books, magazine and newspaper subscriptions), non-print items (e.g., videos, software packages, and other audio-visual materials), and the rapidly growing "electronic" sector (e.g., CD-ROM, laser disk, and online database subscriptions). Traditionally, conventional wisdom dictated that the larger the collection, the better. As electronic sources of information proliferate and the value of up-to-the-minute information increases, this assumption becomes more questionable. Another wildcard related to this issue is the age of library collections. A larger collection is not necessarily a better one, if it consists increasingly of deteriorating volumes of obsolete information.

Annual Operating Expenditures & Capital Outlay for the Library Media Center

Although few library media centers (LMCs) have budgets that include personnel costs, many have budgets for print and non-print materials, electronic access to information, and miscellaneous operating expenses. Additional items called for expenditures on computer equipment and other capital purchases.

School Library Media Management

This section of the questionnaire posed questions regarding how the library budget is requested and received, whether it has an advisory committee, whether its staff meet regularly with their public library counterparts, and whether any challenges or requests for reconsideration of materials have been received during the past year.

Available Data

This study depends on demographic data that, whenever possible, was obtained at the school or neighborhood level.

Available data was incorporated in the study from publicly accessible Web sites for the following variables:

- median family income, projected for 1999
- percentage of population below poverty line
- minority percentage of population

The Federal Financial Institutions Examination Council maintains a site at www.ffiec.gov for the use of financial institutions reporting community investment to the government. This site allows the researcher to enter a street address and zip code and receive information at the Census Tract/BNA level, grouped under income, population, and housing. While the majority of information is from the 1990 census, some variables, such as median family income, are estimated for 1999. This variable is based on Housing and Urban Development (HUD) estimates for the Metropolitan Statistical Area (MSA) or non-MSA area where the school is located. The income module of this site provided the numbers used in this study for percentage of the population below the poverty line and projected median family income for 1999.

When data was not available through the FFIEC site, it was extracted from the US Census American Factfinder module at www.census.gov. The 1999 median family income figures were extrapolated from the 1990 census using an index multiplier to account for the intervening change in the consumer price index. Poverty figures were based on 1990 census data.

The Colorado Department of Education provided data on the number of students in each school and the number of students eligible to receive free or subsidized school lunches in each school. The percentage of the student body receiving school lunch assistance was computed and then used as a school-specific poverty variable.

Both the FFIEC and U.S. Census sites provided minority percentage figures based on the 1990 census. The FFIEC provided the figures at the census tract level based on the school's address. When this information was unavailable from FFIEC, it was obtained from the U.S. Census site at the municipality level.

Each school's enrollment , subdivided by race and ethnicity, was provided by the Colorado Department of Education. Categories included were Native American, Asian/Pacific Islander, Black, Hispanic, and White. Four of these variables, Native American, Asian/Pacific Islander, Black and Hispanic, were then combined to determine the minority percentage of the school population. Both school and community minority percentages were utilized in correlation analysis.

The educational attainment variable demonstrates the general level of education in the school's surrounding population. Educational attainment data was provided by the Colorado Department of Education (CDE). The variable refers to the percentage of people age 20 and over with a high school diploma or equivalency or higher. The Colorado Department of Education provided data at the district level based on the 1990 census.

Total school expenditure data were also provided by the CDE on a district level. The per student expenditure amount was then accorded to each school within that district. Total school budget and per student expenditures were the only factors considered. There were no program breakdowns in such areas as Talented and Gifted or Vocational.

This study also took into consideration key teacher characteristics: their average years of service and average salaries. These figures were provided by the Colorado Department of Education.

The test scores used as indicators of students' academic achievement in this study are 1999 scores on the Colorado Student Assessment Program (CSAP) reading test. This test was administered to virtually all fourth and seventh graders in the spring of 1999. Thus, one of the major criteria for a school entering the study sample was that its enrollment include students in fourth or seventh grade.

Statistical Significance

Statistical significance is an often-misunderstood concept. Usually, when a statistical finding is reported, the first question someone asks is "Is that figure significant?" In this context, the intuitive response is to question the magnitude or size of the figure or the difference between two figures. There are no statistical tests to determine if a difference between two groups is "big enough," particularly if the groups in question represent an entire universe of subjects rather than a sample.

Statistical significance is about reliability or consistency. When a sample is studied, instead of the entire universe (in this case, library media programs in Colorado public schools), a pertinent question is "Are these results truly representative of the universe, or would different samples yield dramatically different results?"

Throughout later sections of this report, statistical significance is reported as "p," as in "probability." Three common milestones for statistical significance are reported: "$p < .05$," "$p < .01$," and "$p < .001$." Respectively, these designations indicate that the probability of reported results being an accident or a coincidence is less than one in 20, one in 100, or one in 1,000. Conversely, these figures may be interpreted to indicate 95, 99, or 99.9 percent certainty that the results are representative.

Throughout this study, statistical significance is most often reported in association with Pearson product-moment correlation coefficients in bivariate correlation analyses.

Bivariate Correlation

In this study, bivariate correlation analysis served two purposes: 1) informing decisions about eliminating or combining variables, and 2) assessing the direction and strength of the relationship between two variables, such as the ratio of library media specialist staff hours to students and CSAP test scores.

Pearson's correlation coefficient (r) indicates the extent to which two variables change together on a scale of -1.00 to zero to 1.00. Negative values indicate that a decline in one variable is associated with an increase in another, while positive values indicate that two variables increase together. For each report of this statistic, there is a corresponding indication of its statistical significance. (See earlier discussion about interpreting statistical significance.) In addition to assessing the direction and strength of relationships, Pearson's r helped to determine if any data elements were so strongly associated as to be either unnecessary or problematic if used together. In some cases, this statistic provided the basis for decisions to combine variables. Such data reduction was deemed desirable as it focused and simplified the model to be tested.

It is very important to note that bivariate correlation makes two kinds of assumptions. It assumes causal order. For this study, previous research and practical experience suggest the presumed sequence of cause and effect. It is intuitively obvious that the status of library media programs may depend on more general school circumstances, just as those circumstances, in turn, may be driven by community conditions. It is equally apparent, however, that each of these sets of variables may affect academic achievement either directly or indirectly via some other variable not represented in this model.

Factor Analysis

While correlation analysis examines relationships between pairs of variables, factor analysis establishes relationships among groups of related variables. This technique was particularly useful when two or more variables needed to be combined, but were measured on different scales (e.g., dollars and percentages).

Instead of reporting the correlation of each variable with each other variable, factor analysis helps to create composite factors by reporting factor loadings that indicate how strongly and in what direction each variable is related to a factor. A factor loading indicates how much weight is assigned to a given factor for a given variable. Factors on which a variable loads highly are closely related to that variable. At this stage, factor analysis was a more efficient method of confirming--and discovering--relationships among variables than comparing multiple relationships among pairs of variables.

Exactly how factor analysis works need not be understood. When sorted by factor, the results are easy to interpret, since a researcher can readily identify variables which load highly on a given factor. The researcher, however, must interpret what a factor represents and decide what to call it. The factor analysis technique will also generate a factor score based on a school's values on the variables which load on a factor. In several instances, closely related variables were replaced by a factor score.

Regression

Multiple regression was used to weigh the effects of library media variables relative to school and community variables as predictors of academic

ERRATA

The portion of the methodology section under the heading, Regression, characterizes the study's regression analysis as a path analysis. This is incorrect. To correct this section, please read it as follows:

On page 37:

Strike the first full paragraph beginning "This application of multiple regression techniques ..."

In the second full paragraph, last sentence, beginning "In a path analysis via multiple regression ..." strike the words "a path analysis via."

In the third full paragraph, first sentence, beginning "It is very important to note that path analysis ..." change the word "path" to "regression."

For the second sentence in that paragraph substitute "It is intuitively obvious that the community, school and library media variables are likelier causes than effects of academic achievement."

Delete the final sentence of that paragraph, beginning "It is equally apparent..."

In the fourth full paragraph, first sentence, change the word "model" to "regression analysis."

On page 38:

In the second paragraph, second sentence beginning "In each case ..." change "path coefficients" to "standardized beta coefficients." In the following sentence, change the word "path" to "beta."

Strike the final sentence on the page beginning "After the direct effects of all variables ..."

achievement. This technique is especially useful in assessing complex relationships among several potential predictors, because it weighs the importance of each predictor variable while ruling out the effects of the others.

This application of multiple regression techniques is a path analysis because both research and practice suggest a certain cause-and-effect order among the variables. In this model, community variables precede school variables, and school variables precede library media variables. All three sets of predictors precede—and may affect directly and/or indirectly—academic achievement. Multiple regression is used to assess the strength and direction of each separate path from variable to variable. These relationships are reported as path coefficients (i.e., betas or standardized regression coefficients).

Correlation and factor analyses of the original data elements helped to refine the model. They provided the basis for decisions to eliminate redundant variables and combine those that were so closely related as to produce statistical "static." In a path analysis via multiple regression, such "noise" complicates a model unnecessarily and suppresses the effects of other predictors statistically.

It is very important to note that path analysis makes two kinds of assumptions. It assumes causal order. The presumed cause-and-effect order in this model is suggested by previous research and practical experience. It is intuitively obvious that the status of library media centers may depend on more general school circumstances, just as they, in turn, may be driven by community conditions. It is equally apparent, however, that each of these sets of variables may affect academic achievement either directly or indirectly via some other variable not represented in this model.

An assumption of causal closure supposes that no critical variables are omitted from the model. This assumption is addressed by this study. Without apology, its focus is on assessing the impact of school library media centers on academic achievement. The community and school variables included represent major antecedent conditions that might explain away that impact. For instance, the possibility that a correlation between the level of library media staffing and test scores might be a spurious result of generally high levels of staffing in a school was addressed by including the teacher-pupil ratio. Similarly, the possibility that a correlation between time spent by library media staff on library/information literacy instruction and test scores might be a spurious result of community affluence or socio-economic advantages was addressed by considering several alternative measures of those variables.

Because the original number of variables was large, it is assumed that an acceptable degree of causal closure was established. Nonetheless, Multiple R Square (R^2) is taken as a sufficient statistical indicator of the extent to which the model may not be causally closed. This statistic indicates the percentage of variation in test scores which is explained by a given group of predictors.

Separate analyses were conducted for elementary and secondary levels. In each case, multiple regression was used to generate initial path coefficients. Variables whose path coefficients were less than .10 and which were not statistically significant at at least the .05 level (generally accepted standards) were automatically eliminated from the analysis.

After the direct effects of all variables on test scores were recalculated, indirect effects from community to school to library media center were calculated.

Findings

Like other recent studies (Lance, et. al., 1999; Lance, et. al., 2000a), this one finds that there is a positive relationship between the presence of adequate library media (LM) staffing and higher academic achievement as indicated by Colorado Student Assessment Program (CSAP) reading scores. Indeed, the findings of this study go much further. They establish that the relationships between many facets of well-developed LM programs and academic achievement are positive and statistically significant and that they cannot be explained away by other school and community conditions. Well-developed LM programs are identified in terms of LM staffing levels, the variety and quantity of information resources in the library media center (LMC) collection, and its level of funding. In addition to assessing the role of the LM program's infrastructure, the study also examines how LM staff, particularly licensed library media specialists (LMSs), do their jobs. These dimensions of job performance are structured around the major themes of the American Association of School Librarians' **Information Power** standards for LM programs: leadership, collaboration, and technology. (See Figures 1 and 2, pp. 10-11.)

Level of LM Program Staffing Linked to Higher CSAP Reading Scores

In promoting high academic achievement, the success of any LM program depends on the presence of adequate staffing—at least one full-time, licensed library media specialist (LMS) with at least one full-time aide or other support staff. For both tested grades, schools with better-staffed LM programs have higher CSAP reading scores.

In 1998/99, about two-thirds of Colorado elementary schools with better staffed LM programs (54 percent) reported average or above percentages of students reading at grade level, while almost three out of five elementary schools with less well-staffed LM programs reported below average percentages of grade-level readers in fourth grade. (See Table 2.)

Table 2. Fourth Grade CSAP Reading Scores by Level of LM Program Staffing for Elementary Schools, 1998/99

Level of LM Program Staffing	Percent Proficient or Above on 4th Grade CSAP Reading Test		Total
	Average or above	Below average	
Average or above	33 54%	28 46%	61 100%
Below average	22 38%	36 62%	58 100%
Total	55 46%	64 54%	119 100%

The same year, over half of middle schools with better staffed LM programs (55 percent) reported average or above percentages of seventh graders reading at grade level, while a similar proportion of middle schools with less well-staffed programs (54 percent) reported below average percentages of grade-level readers in seventh grade. (See Table 3.)

Table 3. Seventh Grade CSAP Reading Scores by Level of LM Program Staffing for Elementary Schools, 1998/99

Level of LM Program Staffing	Percent Proficient or Above on 7th Grade CSAP Reading Scores		Total
	Average or above	Below average	
Average or above	21 55%	17 45%	38 100%
Below average	16 46%	19 54%	35 100%
Total	37 51%	36 49%	73 100%

Consistently, at both elementary and middle school levels, students in tested grades are more likely to be reading at grade level if their schools have adequately staffed LM programs. However, simply dividing schools between those with more and fewer LM staff and those with higher and lower performing students on the CSAP reading test masks the strength of the relationship between LM staffing and academic achievement. It also glosses over subtler but more important questions:

- How do LM staff make a difference? How do they interact effectively with administrators, other teachers, and students? What do they contribute to the teaching and learning process?

- What is the role of the LMC collection—particularly books, periodical subscriptions, and electronic reference titles? How do LM staff develop collections that are integral to successful teaching and learning? What is the impact of the age of the LM collection on student performance? And, how does spending on the LM collection affect its age?
- What is the role of technology in the LM program? How does student and teacher access to computers both within the LMC and beyond—in classrooms, labs, and offices—extend the reach of the LM program beyond its own walls?

All of these questions are addressed in the findings of this study.

Levels of Staff, Collection & Budget Indicate LM Program Development

In the original Colorado study (Lance, et. al., 1993), a critical factor was a composite measure of the size of the library media (LM) staff and collection. For this analysis, a slightly more sophisticated LM Program Development factor was developed. Of the many details collected about LM program infrastructure in Colorado elementary schools, positive and highly statistically significant relationships with each other were exhibited by four ratios: total LM staff hours per 100 students, print volumes per student, periodical subscriptions per 100 students, and total LM expenditures per student. (See Table 4.)

Table 4. Bivariate Correlation Coefficients for LM Program Development Variables for Elementary Schools, 1998/99

Pearson correlation (r) **Significance (p)** **Number (N)**	**Total LM Staff Hours per 100 Students**	**Print Volumes per Student**	**Periodical Subscriptions per 100 Students**	**Total LM Expenditures per Student**
Total LM Staff Hours per 100 Students	1.000 ----- 124			
Print Volumes per Student	.111 .122 112	1.000 ----- 114		
Periodical Subscriptions per 100 Students	.484** .000 113	.241** .005 113	1.000 ----- 116	
Total LM Expenditures per Student	.238** .005 113	.237** .006 110	.595** .000 113	1.000 ----- 116

* p < .05 (1-tailed)
** p < .001 (1-tailed)

For the sake of data reduction, other data items in the LM program development category were discarded, and these four items were combined into a single LM Development factor score based on the results of a factor analysis. All four of the items in question load highly on the resulting factor, which explains over half of the variation among the constituent statistics. These high factor loadings indicate that each of these statistics makes a substantial contribution to the composite measure—the LM Program Development factor—thereby achieving the goal of data reduction without substantial loss of information. (See Table 5.)

Table 5. Factor Analysis of LM Program Development Variables for Elementary Schools, 1998/99

Variable	LM Program Development Factor Loading
Total LM Staff Hours per 100 Students	.663
Print Volumes per Student	.507
Periodical Subscriptions per 100 Students	.877
Total LM Expenditures per Student	.762

Principal component analysis, initial eigenvalue = 2.046, percent of variance explained = 51.2%

At the middle school level, the LM Program Development factor is an even more sophisticated measure. In addition to the variables utilized at the elementary level, two additional ratios—LMS hours per 100 students and electronic reference titles per 100 students—were involved. As at the elementary level, all six of these variables relating to LM staffing, collections, and expenditures at the middle school level were correlated with each other strongly, positively and statistically significantly. (See Table 6.)

More $$, More Quality, More Quantity

With increased funds I am able to purchase more quality and quantity in resources. Within one classroom, more students have access to resources at the same time, meaning much less time is needed to cycle kids through in order to complete a task. For example, students rotate through different stations such as books, CD ROMs, and Internet during a research project. By purchasing lab sets or network versions of electronic resources, it greatly reduces the amount of time it takes for all students to have a turn.

Fran Grzenda
Foothill Elementary School
Boulder

Table 6. Bivariate Correlation Coefficients for LM Program Development Variables for Junior High/Middle Schools, 1998/99

Pearson correlation (r) **Significance (p)** **Number (N)**	**LMS Hours per 100 Students**	**Total LM Staff Hours per 100 Students**	**Print Volumes per Student**	**Electronic Reference Titles per 100 Students**	**Periodical Subscriptions per 100 Students**	**Total LM Expenditures per Student**
LMS Hours per 100 Students	1.000 ------- 73					
Total LM Staff Hours per 100 Students	.696** .000 73	1.000 ------- 73				
Print Volumes per Student	.695** .000 71	.703** .000 71	1.000 ------- 73			
Electronic Reference Titles per 100 Students	.668** .000 70	.779** .000 70	.668** .000 73	1.000 ------- 73		
Periodical Subscriptions per 100 Students	.701** .000 71	.646** .000 71	.680** .000 74	.640** .000 73	1.000 ------- 73	
Total LM Expenditures per Student	.788** .000 71	.790** .000 71	.837** .000 74	.755** .000 73	.802** .000 74	1.000 ------- 73

* $p < .05$ (1-tailed)
** $p < .001$ (1-tailed)

Data reduction was also achieved at this school level by combining these six LM Program Development variables into a single score via factor analysis. All six items load very strongly on the resulting factor, and the factor explains over 75 percent of the variation among the constituent statistics. (See Table 7.)

Table 7. Factor Analysis of LM Program Development Variables for Junior High/Middle Schools, 1998/99

Variable	LM Program Development Factor Loading
LMS Hours per 100 Students	.863
Total LM Staff Hours per 100 Students	.877
Print Volumes per Student	.874
Electronic Reference Titles per 100 Students	.863
Periodical Subscriptions per 100 Students	.847
Total LM Expenditures per Student	.949

Principal component analysis, initial eigenvalue = 4.638, percent of variance explained = 77.3%

LM Specialist Involvement with Administrators, Teachers & LM Staff Indicates Leadership

To determine how library media (LM) staff make a difference in their schools, they were asked to report the number of hours per typical week they spent engaging in a variety of professional activities. These activities were divided into two groups based on Information Power's definitions of the leadership and collaboration roles of the library media specialist (LMS).

Of the leadership activities, positive and strongly statistically significant relationships were demonstrated by four at the elementary level: meeting with the principal, serving on the standards committee, serving on curriculum committees, and meeting with LM program staff. (See Table 8.)

Look for leaders under "L" -- for Librarian

The library media specialist needs to be the one person outside of the principal who is familiar with the entire curriculum. By serving on curriculum committees, the media specialist receives a deeper knowledge of the curriculum and has an opportunity to do some informal planning.

Marcia Parrish, Library Media Specialist
Lois Lenski Elementary
Littleton

I co-chair the Technology Committee and am on the Language Arts committee. The result? Better communication and opportunities to develop collaborative units.

Barbara Linnenbrink, Librarian
Challenger Middle School
Colorado Springs

Table 8. Bivariate Correlation Coefficients for Time Spent on Leadership Activities by Elementary School LM Staff, 1998/99

Pearson correlation (r) Significance (p) Number (N)	Meeting with Principal	Serving on Standards Committee	Serving on Curriculum Committee	Meeting with LM Staff
Meeting with Principal	1.000 ----- 124			
Serving on Standards Committee	.381** .000 124	1.000 ----- 124		
Serving on Curriculum Committee	.352** .000 124	.516** .000 124	1.000 ----- 124	
Meeting with LM Staff	.284** .001 124	.305** .000 124	.173* .027 124	1.000 ----- 124

* p < .05 (1-tailed)
** p < .001 (1-tailed)

Advise and Consent

I have started a Library Advisory Committee to help address needs as they arise. The committee this year consists of 4 teachers, 2 parents, the principal and me. I ask for their input when I have a challenged book, in weeding the collection, managing our Accelerated Reader program, and with collection development. With limited funds, I feel I must know the needs of the classroom teachers and the curriculum in order to purchase materials that will support them. Obviously, the most essential element to a successful program is communication. We are all here for a common goal--our students. It just makes sense that we support each other. The teachers are always appreciative when I seek their input. And I, of course, appreciate being kept informed as to what is going on in the classroom so that I can support them also.

Carolyn K. Wittman, Librarian
Explorer Elementary School
Colorado Springs

The relationships among these items suggest that LM specialists are more likely to be leaders in their schools if they

- have the ear and support of the principal and other administrators,
- serve with other teachers as members of the school's standards and curriculum committees, and
- meet regularly with their own staff to plan and evaluate the effectiveness of LM program activities in advancing student learning.

Because all four leadership activity items were collected on the same scale—number of hours per typical week—they were reducible to one variable by simple addition.

A similar Leadership factor was created for middle schools. In addition to the activities included at the elementary level, the middle school version of the Leadership factor also includes time spent by LM staff participating in school faculty meetings. All five of these Leadership indicators demonstrate positive and highly statistically significant relationships with each other. As at the elementary level, these counts of typical weekly hours spent on various activities were combined into a single measure by simple addition. (See Table 9.)

Table 9. Bivariate Correlation Coefficients for Time Spent on Leadership Activities by Junior High/Middle School LM Staff, 1998/99

Pearson correlation (r) **Significance (p)** **Number (N)**	**Meeting with Principal**	**Serving on Standards Committee**	**Serving on Curriculum Committee**	**Participating in Faculty Meetings**	**Meeting with LM Staff**
Meeting with Principal	1.000 ------- 75				
Serving on Standards Committee	.139 .117 75	1.000 ------- 75			
Serving on Curriculum Committee	.357** .001 75	.331** .002 75	1.000 ------- 75		
Participating in Faculty Meetings	.292** .006 75	.507** .000 75	.317** .003 75	1.000 ------- 75	
Meeting with LM Staff	.286** .006 75	.390** .000 75	.327** .002 75	.277** .008 75	1.000 ------- 75

* $p < .05$ (1-tailed)
** $p < .001$ (1-tailed)

LM Specialist Interactions With Students As Well As Teachers Demonstrate Collaboration

Another important factor in the original Colorado study was the Library Media Specialist's (LMS's) Instructional Role. A more sophisticated version of this factor was developed for this study.

When Collaboration activities of elementary school library media (LM) staff were examined, positive and highly statistically significant relationships were found among three activities: identifying materials for teachers (notably, a component of the 1993 LMS Instructional Role factor), teaching information literacy skills to students, and providing in-service training to teachers. The first variable, identifying materials for teachers, reflects the LMS's role as an instructional consultant. The second variable, teaching information literacy, represents the traditional role of the LMS as a specialist teacher. And, the last variable, being an in-service trainer of teachers, expands the concept of the LMS's instructional role from simply being another teacher of students to being a teacher of both students as well as other teachers. (See Table 10.)

Table 10. Bivariate Correlation Coefficients for Time Spent on Collaboration Activities by Elementary School LM Staff, 1998/99

Pearson correlation (r) Significance (p) Number (N)	Identifying Materials for Teachers	Teaching Information Literacy to Students	Providing In-Service Training to Teachers
Identifying Materials for Teachers	1.000 ----- 124		
Teaching Information Literacy to Students	.127 .081 124	1.000 ----- 124	
Providing In-Service Training to Teachers	.215** .008 124	.236** .004 124	1.000 ----- 124

* p < .05 (1-tailed)
** p < .001 (1-tailed)

As with Leadership activities, the weekly hours for these Collaboration activities were simply summed to reduce them to a single measure for elementary schools.

Like the Leadership role, the Collaboration role is somewhat more sophisticated at the middle than the elementary level. In addition to the Collaboration activities for elementary schools, the middle school version of this role also encompasses: planning with teachers and managing information technology.

While LM staff can provide valuable support to teachers by identifying materials for teacher-planned instructional units, a professional LM specialist can be even more helpful to classroom teachers as a colleague and collaborator in the planning of instruction.

Teamwork pays off!

Our librarian, Ann O'Brien, uses effective teaching practices. During each lesson, she monitors and adjusts to student needs and actively involves all students. Students know and understand the purpose of the lesson, how it ties to standards, and they evaluate their progress in meeting the goals. Our librarian is an expert teacher to students and instructional leader for the staff.

Norma Lewis, Principal
Belmar Elementary School
Lakewood

Our LMS, Jan Zielinski, and I have planned and taught many units focusing on research skills and paragraph writing. Topics have included Native Americans, animals, famous women, African Americans, and Denver history. In many cases, we created a detailed rubric for assessments. The research units have increased student performance. The students demonstrate motivation, better research skills and better use of the school library. The units helped the students in all areas of writing and reading--especially in organization.

Jessica Schiefelbein, Teacher
Doull Elementary School
Denver

The LM specialist also plays an important role as the school's manager of information technology. Technical expertise alone is inadequate qualification to play this increasingly important role. The professional education of an LM specialist qualifies her or him not only to manage the physical infrastructure of a school computer network but also to equip students and teachers with the information-seeking strategies they need to use networked information effectively in pursuit of high academic standards. (See Table 11.)

Table 11. Bivariate Correlation Coefficients for Time Spent on Collaboration Activities by Junior High/Middle School LM Staff, 1998/99

Pearson correlation (r) Significance (p) Number (N)	Planning with Teachers	Identifying Materials for Teachers	Teaching Information Literacy to Students	Providing In-Service Training to Teachers	Managing Information Technology
Planning with Teachers	1.000 ------- 75				
Identifying Materials for Teachers	.139 .117 75	1.000 ------- 75			
Teaching Information Literacy to Students	.357** .001 75	.331** .002 75	1.000 ------- 75		
Providing In-Service Training to Teachers	.292** .006 75	.507** .000 75	.317** .003 75	1.000 ------- 75	
Managing Information Technology	.286** .006 75	.390** .000 75	.327** .002 75	.277** .008 75	1.000 ------- 75

* p < .05 (1-tailed)
** p < .001 (1-tailed)

Two heads are better...

The science teacher had to teach a geography unit on Antarctica. Since she hadn't had geography since high school, and there was only one page in the textbook, she came to me to help her with the unit. We developed a research unit using all of the media center resources. The students used the information to prepare a brochure. They did a great job on their products and met five geography standards, three language arts standards and all of the information guidelines in the process.

Corky Stahn, Information Specialist
Escalante Middle School
Durango

LM specialists—like all librarians—are experts at navigating the expanding and ever-changing world of information resources. Today, LMC collections include not only books, periodicals, and traditional audio and video materials (e.g., books on tape, audio CDs, video cassettes) but also newer formats like multimedia CD-ROMs, DVDs, and laser disks. In addition to local collections, LM staff are also navigators of the rapidly growing Internet and World Wide Web. They are trained to identify quality online information by assessing its authority, accuracy, completeness, and timeliness. The Web is also the vehicle for reaching increasing numbers of licensed databases, many of which no longer have counterparts in the print world. LMSs—again, like all librarians—also bridge the divide between information users and information resources and technology. Many professions now train their candidates to be technically knowledgeable about the electronic world, but few—if any—focus as much attention as school librarianship does on understanding and improving human-machine interfaces and the impact of human development on the acquisition of effective information-seeking skills. In this context, this constellation of activities reflects the critical Collaboration role of the LMS.

Learning history first-hand

Our LMS brought a historical research project into my English classroom. This project, envisioned and planned by the LMS, brought my students into the library and the community to do research—research which is focusing on primary sources. Students cannot open an encyclopedia to find answers. They are looking at local history and, therefore, conduct interviews, search microfilm and published government records—all through our library.

Pete Conrad, English Teacher
Eads High School
Eads

Networked Access to Information Indicates Technological Reach of LM Programs

Thanks to the phenomenal development and confluence of computing and telecommunications technologies in the 1990's, library media (LM) programs are no longer bounded by the walls of the library media center (LMC). The library media specialist (LMS) has always had an important role to play as an activist leader within the school. Successful LMSs have always been the ones who asserted themselves as school leaders, meeting with administrators and teachers, serving on key committees, consulting one-to-one with teachers, and being teachers of both students and other teachers. With the advent of local and wide area networks (LANs and WANs), however, the LM collection is less necessary as a physical destination and more a product to be delivered to students and teachers wherever they are—in classrooms, labs, and offices throughout the school building. Indeed, many information resources—even licensed databases—made available by LM programs can now be accessed by students and teachers remotely from their homes, public and academic libraries, and other locations beyond the school campus.

Various ratios of computers to students were examined at both elementary and middle school levels. Three demonstrated positive and highly statistically significant relationships with each other: the number of computers throughout the school building providing networked access to LM resources (minimally, the catalog and basic reference tools) and two subsets of this figure: the number of networked computers providing access to the Internet and World Wide Web and the number providing access to licensed databases. All three of these figures were calculated as ratios per 100 students. (See Tables 12 and 13.)

Table 12. Bivariate Correlation Coefficients for Computer Ratios for Elementary School LM Programs, 1998/99

Pearson correlation (r) **Significance (p)** **Number (N)**	**LM/Networked Computers per 100 Students**	**Internet Computers per 100 Students**	**Licensed Database Computers per 100 Students**
LM/Networked Computers per 100 Students	1.000 ------- 120		
Internet Computers per 100 Students	.812** .000 119	1.000 ------- 119	
Licensed Database Computers per 100 Students	.371** .000 119	.530** .000 119	1.000 ------- 119

* p < .05 (1-tailed)
** p < .001 (1-tailed)

Walls can't hold 'em in

Managing the computer network for our school in addition to my other responsibilities as the Library Media Specialist is a true challenge because of the time required. However, there are also real benefits to this arrangement. I am in every classroom and every curricular area which allows me to discover information needs that I might otherwise miss.

Doris Gay Stanley, Media/Technology Specialist
Willow Creek Elementary School
Englewood

Our media specialist provided instruction in reference skills through library systems and the internet. My students have been exceeding my expectations in their work. It sounds so simple, but they are excited that they can find and use material from places other than just our own school library.

Jennifer Drahnak, Classroom Teacher
Centennial Elementary School
Broomfield

Table 13. Bivariate Correlation Coefficients for Computer Ratios for Junior High/Middle School LM Programs, 1998/99

Pearson correlation (r) Significance (p) Number (N)	LM/Networked Computers per 100 Students	Internet Computers per 100 Students	Licensed Database Computers per 100 Students
LM/Networked Computers per 100 Students	1.000 ------- 74		
Internet Computers per 100 Students	.850** .000 74	1.000 ------- 75	
Licensed Database Computers per 100 Students	.688** .000 74	.773** .000 75	1.000 ------- 75

* p < .05 (1-tailed)
** p < .001 (1-tailed)

At both elementary and middle school levels, these three ratios were combined into a single composite measure of Technology via factor analysis. This approach was chosen over simple addition, because the last two of the ratios are subsets of the first. At both levels, all three ratios loaded highly on a single factor, explaining more than 72 percent and almost 85 percent, respectively, of the variation in those computers-to-students ratios. (See Tables 14 and 15.)

Table 14. Factor Analysis of Computer Ratios for Elementary School LM Programs, 1998/99

Variable	Technology Factor Loading
LM/Networked Computers per 100 Students	.882
Internet Computers per 100 Students	.939
Licensed Database Computers per 100 Students	.710

Principal component analysis, initial eigenvalue = 2.163, percent of variance explained = 72.1%

Where the wild answers are...

I like not having to say to someone, "we don't have anything on that topic" because with access to the Internet we can find almost everything. For example, I couldn't find an answer in any of my print sources to the question "Who was the little girl who wrote President Abraham Lincoln a letter and told him she thought he would look better with a beard?" On the Internet, I found the name of the girl and a copy of her letter.

Mindy Smith, Librarian
Fireside Elementary
Louisville

Table 15. Factor Analysis of Computer Ratios for Junior High/Middle School LM Programs, 1998/99

Variable	Technology Factor Loading
LM/Networked Computers per 100 Students	.921
Internet Computers per 100 Students	.951
Licensed Database Computers per 100 Students	.887

Principal component analysis, initial eigenvalue = 2.540, percent of variance explained = 84.7%

Technology is fruitful, not frivolous!

I imagine my "indicator" was the fact that we have a library computer lab with 11 stations, each connected to the LAN and Internet. The computers have changed library use in interesting ways. At first they were a novelty, and the students wanted to "play" on them. But after almost 10 years, the students see computers as a valuable tool—one of many sources they use in the library. They are proficient users in many ways, and so our focus has shifted from teaching "how to use" to more of "why and when to use". The lab is busy during most of the day. This year our staff made the decision to purchase the motivation and management package, Scholastic Reading Counts!™ I see this as another way to blend technology into our instructional programs, as well as to insure that the library and its print sources are integral to student learning.

Joan Haberkorn, Library Media Specialist
Fruita Middle School
Fruita

Leadership Generates Collaboration, LM Program Development Spurs Technology & Flexible Scheduling

An examination of correlations among potential library media (LM) predictors of academic achievement reveals several noteworthy relationships.

At both elementary and middle school levels, there is a positive and highly statistically significant relationship between the Leadership and Collaboration factors, and the correlation between the two is particularly strong at the elementary level. (See Tables 16 and 17.)

Curiously, when these two themes are referred to in the Information Power standards, Collaboration is always mentioned first. The composition of the two statistical factors representing these concepts in this study and the correlation between them suggests that this order is wrong. More likely, Leadership comes first. Collaboration, certainly initially, appears a more likely result of the library media specialist's (LMS's) success as a leader. If an LMS, particularly at the elementary level, does not have strong support from the principal, is not shoulder-to-shoulder with classroom teachers, and, indeed, does not even have an effective staff team in the library media center (LMC), it is difficult to collaborate effectively with those parties. Conversely, where the LMS is a more activist school leader—meeting regularly with the principal, serving on standards and curriculum committees, and holding regular LM staff meetings—Collaboration activities are more likely to be occurring. LM staff who are school leaders are more likely to be interacting with teachers as instructional units are planned and organized, to be teaching information literacy skills to students, and to be providing in-service training opportunities to other teachers.

Let 'em loose!

I have been at this school for two years. Flexible scheduling was implemented one year before I came by the principal. At that time the library was run by a paraprofessional. I implemented the Accelerated Reader™ the first year I was here. About 4 years ago the students read approximately 8,000 books. Last year, the students read 18,086 and this year at the end of the first semester they have already read 11,672.

Pam Briix, Library Media Teacher
Sargent Schools
Monte Vista

Table 16. Bivariate Correlation Coefficients for Library Media Predictors for Elementary Schools, 1998/99

Pearson correlation (r) Significance (p) Number (N)	LM Program Development	Leadership	Collaboration	Technology
LM Program Development	1.000			

	108			
Leadership	.037	1.000		
	.350	-------		
	108	124		
Collaboration	.054	.545**	1.000	
	.291	.000	-------	
	108	124	124	
Technology	.315**	.072	.093	1.000
	.000	.217	.159	-------
	106	119	119	119

* p < .05 (1-tailed)
** p < .001 (1-tailed)

At the elementary level, there is also a positive and highly statistically significant relationship between LM Program Development and Technology. (See Table 16.) While the economic circumstances of the school may provide an antecedent explanation of that correlation, it is more likely that the presence of a well-developed LM program—adequately staffed, stocked, and funded—would be essential to the development of a computer network adequate to distribute access to information resources throughout the school.

Table 17. Bivariate Correlation Coefficients for Library Media Predictors for Junior High/Middle Schools, 1998/99

Pearson correlation (r) Significance (p) Number (N)	LM Program Development	Leadership	Collaboration	Flexible Scheduling
LM Program Development	1.000 ------- 75			
Leadership	.033 .395 70	1.000 ------- 75		
Collaboration	-.038 .378 70	.285** .007 75	1.000 ------- 75	
Flexible Scheduling	.300** .006 69	-.083 .242 73	.014 .452 73	1.000 ------- 75

* p < .05 (1-tailed)
** p < .001 (1-tailed)

At the middle school level, a positive and highly statistically significant correlation between Flexible Scheduling (individual vs. group visits by students to the LMC) and LM Program Development confirms the conventional wisdom. A program managed by a professionally trained specialist usually provides more open access to the LMC than one managed by someone less qualified—e.g., a classroom teacher or an aide. (See Table 17.)

CSAP Reading Scores Increase With LM Program Development, Collaboration & Technology

In Colorado, the bottom line measure of school effectiveness is student performance on the Colorado Student Assessment Program (CSAP) tests. Of all the tests planned as part of this program, the one given longest and to the greatest number of grades is the reading test. To assess the impact of potential library media (LM) predictors on CSAP scores, this study employs the percentages of students in grades three, four, and seven who scored proficient or above on reading. This "proficient or above" criterion is deemed to represent the proportion of students reading at grade level.

The LM Program Development factor—the composite measure of LM staffing, collections, and funding—exhibits a positive and statistically significant relationship with reading scores for all three tested grades. For grades four and seven, these relationships are highly statistically significant, and the strength of those relationships is almost double its third grade level. (See Table 18.)

Table 18. Bivariate Correlation Coefficients for CSAP Reading Scores and Library Media Predictors, Grades 3, 4 & 7, 1998/99

Pearson correlation (r) **Significance (p)** **Number (N)**	**Percent of Students Scoring Proficient or Above on Reading, 1998/99**		
	3rd Grade	**4th Grade**	**7th Grade**
LM Program Development	.156*	.273**	.289**
	.055	.002	.008
	106	108	70
Collaboration	.198*	.176*	.205*
	.015	.025	.039
	121	124	75
Technology	.076	.182*†/.140	.264*
	.208	.024/.064	.011
	116	118/119	74
Flexible Scheduling			.192*
			.050
			74

* $p < .05$ (1-tailed)
** $p < .001$ (1-tailed)
† r with 1997/98 CSAP reading scores

Of the three factors inspired by the Information Power standards—Leadership, Collaboration and Technology—two demonstrate positive and statistically significant direct effects on CSAP reading scores: Collaboration and Technology. Where LM staff are collaborators—where they work with classroom teachers to identify information resources to support instructional units, where they teach information literacy skills to students, and where they provide in-service training to teachers—CSAP reading scores are higher. The more time LM staff spend in Collaboration activities, the higher the school's percentage of grade-level readers in tested grades. Likewise, where LM programs utilize networked computers to push information resources beyond the walls of the LMC to where students and teachers are—classrooms, labs and offices—CSAP reading scores are higher. This relationship between LM technology and grade-level reading performance by students is a substantially stronger and more highly statistically significant one for seventh grade than for fourth grade.

Notably, the Leadership factor, on its own, did not demonstrate a direct effect on reading scores. On reflection, this is not surprising. The value of Leadership activities is in setting the stage for Collaboration activities. Indeed, if Leadership activities are not pursued wisely, time spent meeting with the principal, serving on committees, and holding LM staff meetings could conceivably weaken the LM program's effectiveness as an integral player in the school's efforts to promote academic excellence. If Leadership activities compete with Collaboration activities, the former are counterproductive.

At the middle school level, the additional predictor of Flexible Scheduling (individual—vs. group—visits by students to the LMC) demonstrates a positive and statistically significant relationship with reading scores. Decades of reading studies (some of which were reviewed earlier) indicate consistently that one of the most reliable predictors of reading achievement is Free Voluntary Reading (FVR). Students who are allowed to visit the LMC individually, rather than as part of a structured group activity, are more likely to be exploring topics or selecting titles or authors of their own choosing.

Teamwork to meet standards

Our media specialists—Barbara Thorngren, Pat Holloway, and Norma Nixon—work with our U.S. History and American Literature classes to do a research project from start to finish. Individual language arts and social studies teaching teams meet with the media specialists before bringing students to the media center.

In addition to the agreed-upon goals for all the teachers, the media specialists work with the individual teams to make it a collaborative learning experience for teachers and library media personnel as well as beneficial for students. The project meets history, language arts, and media standards.

Students are taught the research process, including accessing and using both primary and secondary resources. As a teacher of juniors and seniors, my students' ability to access media materials and appropriately use the information in their papers is very evident in the quality of the papers they produce.

Debbe Milliser, Social Studies Teacher
Eaglecrest High School
Aurora

CSAP Reading Scores Increase With Currency of Reference Collections

Another important library media (LM) predictor of CSAP reading scores is the age of collections. It is difficult to assess this issue for general collections containing important historical works. While it is usually preferable to have a preponderance of newer non-fiction works, the value of many historical documents, like **The Federalist Papers**, and literary classics, like **Huckleberry Finn**, is undiminished by age. The one area in which this issue may be safely explored is the reference collection. It is almost always preferable for the LMC to have newer reference works.

The relationship between reference collection age and CSAP reading scores was explored in isolation due to the limited amount of data reported on this topic. Only elementary schools reported average copyright dates in sufficient numbers to analyze the data statistically at all. However, the number of elementary schools reporting these dates was sufficiently small and the dates themselves were distributed in such a way as to make it impossible to incorporate this variable into the larger analysis.

Among reporting elementary schools, 63 percent of those whose LMCs have reference collections with average copyright dates of 1990 or after had average or above percentages of fourth graders reading at grade level. Conversely, the same percentage of elementary schools whose LMCs had reference collections with average copyright dates before 1990 had below average percentages of fourth graders reading at grade level. This relationship is both positive and statistically significant. (See Table 19.)

Table 19. Fourth Grade CSAP Reading Scores by Age of Reference Collections, 1998/99

Average Copyright Year	Percent of Students Scoring Proficient or Above on 4th Grade CSAP Reading Test		Total
	Average or above	Below average	
1990 or after	40 62.5%	24 37.5%	64 100.0%
Before 1990	11 36.7%	19 63.3%	30 100.0%
Total	51 54.3%	43 45.7%	94 100.0%

Chi-square = 5.492, $p < .05$

Collection age demonstrates a substantial effect on CSAP reading scores. Schools whose LMCs have newer reference materials averaged 67 percent of fourth graders reading at grade level, while schools whose LMCs have older materials averaged 59 percent reading at grade level—a difference of eight points and almost 14 percent. (See Table 20.)

Table 20. Mean Percent Scoring Proficient or Above on Fourth Grade CSAP Reading Test by Age of Reference Collections, 1998/99

Average Copyright Year	Number	Mean Percent Scoring Proficient or Above on 4th Grade CSAP Reading Test	Percent Difference, Before 1990 to 1990 or after
1990 or after	64	67	13.6%
Before 1990	30	59	

F = 5.189, p < .05, t = 2.218, p <.05

While the average age of the reference collection was utilized in this analysis to avoid the complicating factor of historical non-fiction works, these results likely represent the impact of collection age in general on reading achievement. Also, while there was sufficient data to explore this issue only at the elementary school level, it is likely that a similar relationship exists at the middle school level.

LM Program Development Second Only to Student Socio-Economic Status as Predictor of CSAP Reading Scores

The bivariate correlation between the LM Program Development factor and CSAP reading scores is insufficient alone to claim a cause and effect relationship between those two variables. Conceivably, a variety of school and community conditions might create antecedent conditions that would explain both LM Program Development and reading scores. For instance, it might be that rich schools or communities with well-educated adults have both high reading scores and well-developed LM programs. If that were the case, a well-developed LM program could not be credited as even a partial cause of high reading scores. It would simply be another fortuitous consequence of favorable school or community conditions.

Given data on potential antecedent conditions, however, such hypotheses are readily testable via multiple regression analysis. That statistical technique weighs the impact of each variable while controlling for all variables under consideration.

In this analysis, potential predictors of reading scores to be considered together at both elementary and middle school levels include:

- the LM Program Development factor (a composite per-student measure of LM staffing, collection and funding levels);
- four school conditions: total school district expenditures per student, the teacher-pupil ratio, average salaries and years of experience for teachers; and
- three community conditions: poverty (based on National School Lunch Program data), adult educational attainment (percent age 25 and over who graduated from high school), and the prevalence of racial/ethnic minority schoolchildren.

For the elementary school level, the strongest statistical model explaining fourth grade CSAP reading scores includes: the percentage of students eligible for the National School Lunch Program (i.e., poor students), the LM Program Development factor, and the percentage of students from racial/ethnic minority groups—in that order. The first and last of those variables demonstrate statistically significant inverse relationships with reading scores. In other words, the more poor and minority students an elementary school has, the lower its fourth grade CSAP reading scores tend to be. Together, these three predictors explain away all the others considered: school district expenditures per pupil, teacher-pupil ratio, average teacher salaries and years of experience, and adult educational attainment. Somewhat surprisingly, after poverty is taken into consideration, the prevalence of racial/ethnic minorities follows rather than precedes LM Program Development in importance as a predictor of reading scores. On second thought, perhaps this finding should not be so unexpected; doubtless, a substantial proportion of the conditions that discourage educational success by minority students are attributable directly to poverty. (See Table 21.)

Table 21. Regression Analysis of 4th Grade CSAP Reading Scores with LM, School & Community Predictors, 1998/99

Predictor Added	Cumulative R	Cumulative R Square	R Square Change	Standardized Beta Coefficient
Percent of Students Eligible for National School Lunch Program (poverty)	.638	.407	.407	-.471
LM Program Development	.694	.482	.075	.238
Percent of Students Minorities	.709	.502	.021	-.225

p < .05

The results of a comparable regression analysis for middle schools are very similar. After poverty, however, the prevalence of minority schoolchildren is the next strongest predictor of seventh grade CSAP reading scores. LM Program Development, following close behind, is once again the only positive predictor of reading scores among the variables considered. (See Table 22.)

Table 22. Regression Analysis of 7th Grade CSAP Reading Scores with LM, School & Community Predictors, 1998/99

Predictor Added	R	R Square	R Square Change	Standardized Beta Coefficient
Percent of Students Eligible for National School Lunch Program	.848	.719	.719	-.602
Percent of Minority Students	.860	.739	.021	-.259
LM Program Development	.869	.756	.016	.131

p < .01

LM Staffing Linked with CSAP Reading Scores Despite Other School & Community Conditions

The results of the foregoing correlation and regression analyses provide the strongest statistical evidence to date of the relationships between and among:

- LM Program Development (staffing, collection and funding levels);
- the Information Power themes of Leadership, Collaboration and Technology; and
- reading scores for elementary and middle school students.

That analytical strategy is important to have followed, because it controlled for school and community differences that some are inclined to believe explain away the importance of strong LM programs. On the contrary, the regression analysis results clearly indicate that the staffing, collection and funding levels of the LM program exert positive and statistically significant effects, even when controlling for other school and community differences believed—erroneously—to explain away their importance.

Nonetheless, regression coefficients do not have much appeal to non-statisticians. To illustrate more concretely the patterns reflected in this study's results, consider the following illustrative tables. For each school or community condition, particular cases were identified for which, despite a deteriorating school or community condition, CSAP reading scores increase with LM staffing. It is cases such as these that are reflected in the regression analysis results.

District Expenditures Per Student

Despite decreasing district expenditures per student at both elementary and middle school levels, CSAP reading scores increase with LM staff hours per week. (See Tables 23 and 24.)

Table 23. Total Library Media Staff Hours and 4th Grade CSAP Reading Scores for Selected Elementary Schools Ranked by District Expenditures Per Student, 1998/99

School (District)	District expenditures per student	Total library media staff hours	Percent proficient & above on CSAP reading test
Falcon ES (Falcon)	$9,585	35	47
Glenwood Springs ES (Roaring Fork)	$8,361	40	68
Heatherwood ES (Boulder Valley)	$7,839	53	76
Indian Ridge ES (Cherry Creek)	$7,704	115	88

Table 24. Total Library Media Staff Hours and 7th Grade CSAP Reading Scores for Selected Middle/Junior High Schools Ranked by District Expenditures Per Student, 1998/99

School (District)	District expenditures per student	Total library media staff hours	Percent proficient & above on CSAP reading test
East MS (Adams-Arapahoe)	$7,241	40	37
Creighton MS (Jefferson County)	$6,621	65	57
Sterling MS (Valley)	$6,527	80	62
Holmes MS (Colorado Springs)	$6,006	120	70
Webber JHS (Poudre)	$5,902	133	76

Teacher-Pupil Ratio (Teachers Per 100 Students)

Notwithstanding waning numbers of teachers relative to elementary and middle school students, CSAP reading scores rise with LM staff hours per week. (See Tables 25 and 26.)

Table 25. Total Library Media Staff Hours and 4th Grade CSAP Reading Scores for Selected Elementary Schools Ranked by Teacher/Pupil Ratio, 1998/99

School (District)	Teachers per 100 students	Total library media staff hours	Percent proficient & above on CSAP reading test
Stevens ES (Valley)	8.8	25	47
West ES (East Otero)	6.8	40	62
Florida Mesa ES (Durango)	6.3	60	65
O'Dea ES (Poudre)	5.4	75	87
Indian Ridge ES (Cherry Creek)	5.2	115	88

Table 26. Total Library Media Staff Hours and 7th Grade CSAP Reading Scores for Selected Middle/Junior High Schools Ranked by Teacher/Pupil Ratio, 1998/99

School (District)	Teachers per 100 students	Total library media staff hours	Percent proficient & above on CSAP reading test
Burlington MS (Burlington)	6.8	42	38
Las Animas MS (Las Animas)	6.7	53	46
Sterling MS (Valley)	5.1	80	62
Holmes MS (Colorado Springs)	4.9	120	70
Webber JHS (Poudre)	4.7	133	76

Teachers' Average Years of Experience

In the face of declining years of experience for elementary and middle school teachers, CSAP reading scores climb as weekly LM staff hours improve. (See Tables 27 and 28.)

Table 27. Total Library Media Staff Hours and 4th Grade CSAP Reading Scores for Selected Elementary Schools Ranked by Teachers' Average Years of Experience, 1998/99

School (District)	Teachers' average years of experience	Total library media staff hours	Percent proficient & above on CSAP reading test
Moore ES (Poudre)	22	35	43
Truscott ES (Thompson)	17	40	60
Franklin ES (Littleton)	16	60	76
Wilder ES (Littleton)	15	80	82
Indian Ridge ES (Cherry Creek)	12	115	88

Table 28. Total Library Media Staff Hours and 7th Grade CSAP Reading Scores for Selected Middle/Junior High Schools Ranked by Teachers' Average Years of Experience, 1998/99

School (District)	Teachers' average years of experience	Total library media staff hours	Percent proficient & above on CSAP reading test
Baker MS (Denver)	11	40	21
Overland Trail MS (Brighton)	11	56	37
Carson MS (Fountain)	11	60	49
Lewis-Palmer MS (Lewis-Palmer)	11	78	71
Conrad Ball MS (Thompson)	11	90	66

Teachers' Average Salary

Even as average salaries fall for elementary and middle school teachers, CSAP reading scores improve as weekly hours of LM staff increase. (See Tables 29 and 30.)

Table 29. Total Library Media Staff Hours and 4th Grade CSAP Reading Scores for Selected Elementary Schools Ranked by Teachers' Average Salary, 1998/99

School (District)	Teachers' Average Salary	Total library media staff hours	Percent proficient & above on CSAP reading test
Moore ES (Poudre)	$43,706	35	43
Erie ES (St. Vrain)	$43,196	37	67
Hygiene ES (St. Vrain)	$41,842	40	79
Douglas ES (Boulder Valley)	$41,712	43	83
O'Dea ES (Poudre)	$40,317	75	87

Table 30. Total Library Media Staff Hours and 7th Grade CSAP Reading Scores for Selected Middle/Junior High Schools Ranked by Teachers' Average Salary, 1998/99

School (District)	Teachers' average salary	Total library media staff hours	Percent proficient & above on CSAP reading test
N Arvada MS (Jefferson County)	$40,536	40	45
Canon City MS (Canon City)	$38,567	59	59
Mead MS (St. Vrain)	$37,294	70	61
Boltz JHS (Poudre)	$37,093	120	78
Eagleview MS (Academy)	$36,208	155	84

Students Eligible for National School Lunch Program (Poor Students)

Despite higher numbers of poor students in elementary and middle schools, CSAP reading scores increase with weekly LM staff hours. (See Tables 31 and 32.)

Table 31. Total Library Media Staff Hours and 4th Grade CSAP Reading Scores for Selected Elementary Schools Ranked by Percentage of Students Eligible for National School Lunch Program, 1998/99

School (District)	Percent of NSLP students	Total library media staff hours	Percent proficient & above on CSAP reading test
Ute Meadows ES (Jefferson County)	1.1	40	63
Sierra ES (Jefferson County)	5.3	60	73
Linton ES (Poudre)	11.4	70	84
O'Dea ES (Poudre)	29.9	75	87

Table 32. Total Library Media Staff Hours and 7th Grade CSAP Reading Scores for Selected Middle/Junior High Schools Ranked by Percentage of Students Eligible for National School Lunch Program, 1998/99

School (District)	Percent of NSLP students	Total library media staff hours	Percent proficient & above on CSAP reading test
Laredo MS (Cherry Creek)	9.0	40	62
Gunnison MS (Gunnison Watershed)	12.3	45	64
Fruita MS (Mesa County Valley)	39.5	80	72

Minority Students

Notwithstanding larger percentages of minority students in elementary and middle schools, CSAP reading scores improve with LM staff hours. (See Tables 33 and 34.)

Table 33. Total Library Media Staff Hours and 4th Grade CSAP Reading Scores for Selected Elementary Schools Ranked by Percent of Minority Students, 1998/99

School (District)	Percent of minority students	Total library media staff hours	Percent proficient & above on CSAP reading test
Edith Teter ES (Park County)	2.0	20	64
Upper Blue ES (Summit)	3.3	44	72
Bradford Primary School (Jefferson County)	6.1	60	81
Niwot ES (St. Vrain)	6.3	65	87
Indian Ridge ES (Cherry Creek)	14.8	115	88

Table 34. Total Library Media Staff Hours and 7th Grade CSAP Reading Scores for Selected Middle/Junior High Schools Ranked by Percent of Minority Students, 1998/99

School (District)	Percent of minority students	Total library media staff hours	Percent proficient & above on CSAP reading test
Manitou Springs MS (Manitou Springs)	6.5	40	61
Louisville MS (Boulder Valley)	8.9	50	74
Boltz JHS (Poudre)	11.4	120	78

Adult Educational Attainment

In the face of decreasing numbers of high school graduates in the adult population, fourth and seventh grade CSAP reading scores climb with LM staff hours. (See Tables 35 and 36.)

Table 35. Total Library Media Staff Hours and 4th Grade CSAP Reading Scores for Selected Elementary Schools Ranked by Percent of Adults Who Graduated From High School, 1998/99

School (District)	Percent of adults high school graduates	Total library media staff hours	Percent proficient & above on CSAP reading test
Trails West ES (Cherry Creek)	95.2	40	60
Heatherwood ES (Boulder Valley)	94.0	53	76
Fireside ES (Boulder Valley)	94.0	58	81
Linton ES (Poudre)	91.3	70	84
O'Dea ES (Poudre)	91.3	75	87

Table 36. Total Library Media Staff Hours and 7th Grade CSAP Reading Scores for Selected Middle/Junior High Schools Ranked by Percent of Adults Who Graduated From High School, 1998/99

School (District)	Percent of adults high school graduates	Total library media staff hours	Percent proficient & above on CSAP reading test
Laredo MS (Cherry Creek)	95.2	40	62
Wellington MS (Poudre)	91.3	70	68
Holmes MS (Colorado Springs)	86.8	120	70

While there are certainly contradictory examples, the examples in the preceding tables illustrate the prevailing relationship between well-developed LM programs and reading scores confirmed by regression analysis. These examples also illustrate how LM staff make a difference, not just when controlling for other school and community conditions but even when those other conditions deteriorate.

Schools With Better LM Programs Average Higher CSAP Reading Scores

How great an increase in reading scores can be expected from improvements in a school's LM program? Tables 37 and 38 report average (mean and median) CSAP reading scores for the 25 LM programs rated highest and lowest on various criteria among the study sample.

Among elementary schools, those with the most well-developed LM programs—those with the most staff, the largest collections, and the highest expenditures—average 72 to 74 percent of fourth graders reading at grade level. That is an 18 percent increase over the least developed LM programs, which average 61 to 63 percent.

Elementary schools with the most collaborative LM programs average 72 to 76 percent of fourth graders reading at grade level. This is an 18 to 21 percent increase over schools with the least collaborative LM programs, which average 61 to 63 percent.

Elementary schools with the most extensive state-of-the-art computer networks linking students and teachers throughout the school with information resources average 68 to 72 percent of fourth graders reading at grade level. That represents a six to 13 percent improvement over schools with the least technologically sophisticated LM programs; they average 64 to 65 percent. (See Table 37.)

Table 37. Comparison of 4th Grade CSAP Reading Scores for Highest and Lowest Rated Library Media Programs, 1998/99

Average CSAP Reading Scores by	25 Highest Rated LM Programs		25 Lowest Rated LM Programs		Percent Difference (lowest to highest)	
Predictor	**Mean**	**Median**	**Mean**	**Median**	**Mean**	**Median**
LM Program Development	72	74	61	63	18%	18%
Information Power Principles						
Collaboration	72	76	61	63	18%	21%
Technology	68	72	65	64	6%	13%

Among middle schools, those with the most well-developed LM programs average 57 to 61 percent of seventh graders reading at grade level. That is a 10 to 15 percent increase over middle schools with the least developed LM programs; they average 52 to 53 percent. (See Table 38.)

Middle schools with the most collaborative LM programs average 56 percent of seventh graders reading at grade level. That is an eight percent improvement over middle schools with the least collaborative LM programs average 52 percent.

Middle schools with the most extensive, state-of-the-art computer networks linking students and teachers throughout the school with information resources average 65 to 70 percent of seventh graders reading at grade level. That is an 18 to 25 percent increase over middle schools with the least technologically sophisticated LM programs; they average 55 to 56 percent.

Middle schools where students have more flexible, individual access to the LMC average 60 to 62 percent of seventh graders reading at grade level. That represents a 13 to 22 percent increase over LMCs on more fixed schedules, ones which students can usually only visit as part of a class or other formal group. They average 51 to 53 percent. (See Table 38.)

Table 38. Comparison of 7th Grade CSAP Reading Scores for Highest and Lowest Rated Library Media Programs, 1998/99

Average CSAP Reading Scores by	25 Highest Rated LM Programs		25 Lowest Rated LM Programs		Percent Difference (lowest to highest)	
Predictor	**Mean**	**Median**	**Mean**	**Median**	**Mean**	**Median**
LM Program Development	57	61	52	53	10%	15%
Information Power Principles						
Collaboration	56	56	57	52	0%	8%
Technology	65	70	55	56	18%	25%
Flexible Scheduling						
Individual LMC visits per student	60	62	53	51	13%	22%

Consistently, where LM programs are better developed—better staffed, stocked, and funded—students earn 10 to 15 percent higher reading scores. Gains in reading scores reach as high as 25 percent where these programs are also staffed by assertive school leaders who teach information literacy skills to students and foster an atmosphere of collegial collaboration with teachers and administrators.

Schools with Higher CSAP Reading Scores Have Stronger LM Programs

How much does an individual library media program need to improve to move from being among the lowest scoring schools on the CSAP reading test to being among the highest scoring ones?

With only a handful of exceptions, elementary and middle schools with the highest percentages of grade level readers

- have demonstrably better developed LM programs—usually about 50 percent higher levels of staffing, collections and funding;
- spend more time engaged in leadership and collaboration activities—on average, for example, twice as much time serving on standards committees; and
- have more extensive and sophisticated computer networks extending the reach of their LM programs—generally, 50 percent higher ratios of computers to students.

In short, while the percentage differences from elementary to middle school and from one LM program feature to another vary somewhat, the prevailing pattern is that a 50 percent increase in most LM program investments is associated with a 100 percent increase in a school's percentage of grade level readers. (See Tables 39 and 40.)

Table 39. Comparison of Highest and Lowest Scoring Elementary Schools on Key Library Media Predictors of 4th Grade CSAP Reading Scores, 1998/99

4th Grade CSAP Reading Scores & Predictors	25 Highest Scoring Schools		25 Lowest Scoring Schools		Percent Difference (lowest to highest)	
	Mean	Median	Mean	Median	Mean	Median
Percent of Students with Proficient or Above CSAP Reading Scores	83.19	83.00	43.00	44.00	93%	89%
LM Program Development						
LM staff hours per 100 students	14.67	12.68	9.38	8.92	56%	42%
Print volumes per student	20.28	17.34	14.20	16.20	43%	7%
Subscriptions per 100 students	4.84	3.87	3.25	2.97	49%	30%
LM expenditures per student	21.60	11.13	14.00	11.02	54%	1%
Leadership (weekly hours)						
Meeting with administrators	0.77	0.50	0.37	0.25	108%	100%
Serving on standards committees	0.45	0.50	0.37	0.25	10%	100%
Serving on curriculum committees	0.73	0.25	0.60	0.50	22%	-50%
Holding library staff meetings	0.62	0.50	0.54	0.50	15%	0%
Collaboration (weekly hours)						
Identifying materials for teachers	3.19	2.00	2.09	2.00	53%	0%
Teaching information literacy to students	6.46	5.50	5.04	3.00	28%	83%
Providing in-service training to teachers	0.94	0.50	0.64	0.25	47%	100%
Providing reading motivation activities for students	6.11	6.00	4.97	5.00	23%	20%
Technology (per 100 students)						
Computers in or networked to LMC	10.16	7.09	7.74	3.43	38%	107%
Computers linked to library databases	5.11	0.24	2.57	0.38	99%	-37%
Computers linked to the Internet	7.17	2.21	4.35	2.22	65%	0%

Table 40. Comparison of Highest and Lowest Scoring Junior High/Middle Schools on Key Library Media Predictors of 7th Grade CSAP Reading Scores, 1998/99

7th Grade CSAP Reading Scores & Predictors	25 Highest Scoring Schools		25 Lowest Scoring Schools		Percent Difference (lowest to highest)	
	Mean	Median	Mean	Median	Mean	Median
Percent of Students with Proficient or Above CSAP Reading Scores	75.65	74.00	35.92	37.00	111%	100%
LM Program Development						
LMSs per 100 students	7.06	5.35	4.55	5.04	55%	6%
Total staff per 100 students	13.00	9.63	10.72	10.30	21%	-7%
Print volumes per student	16.53	13.02	13.87	14.48	19%	-10%
Subscriptions per 100 students	7.84	4.97	5.26	3.89	49%	28%
E-reference titles per 100 students	7.00	2.14	2.66	1.30	163%	65%
LM expenditures per student	22.33	14.11	13.44	11.35	66%	24%
Leadership						
Meeting with administrators	0.56	0.50	0.49	0.50	14%	0%
Serving on standards committee	1.12	0.38	0.56	0.00	100%	
Serving on curriculum committee	0.51	0.00	0.56	0.25	-9%	-100%
Attending school staff meetings	0.83	0.75	0.60	0.50	38%	50%
Holding library staff meetings	0.69	0.50	0.60	0.50	15%	0%
Collaboration						
Planning with teachers	2.37	2.00	2.22	1.50	7%	33%
Identifying materials for teachers	3.42	2.00	2.22	2.00	41%	0%
Teaching information literacy to students	8.73	5.00	6.50	6.50	34%	-23%
Providing in-service training to teachers	1.88	1.00	0.56	0.50	236%	100%
Managing information technology	10.91	5.75	9.42	6.00	16%	-4%
Technology (per 100 students)						
computers in or with access to LMC	12.83	11.89	8.45	6.55	52%	82%
computers linked to library databases	6.98	5.18	4.03	1.05	73%	393%
computers linked to Internet	9.96	9.25	6.15	1.55	62%	497%
Flexible Scheduling						
LMC visits by individual students	0.94	0.61	0.53	0.39	77%	56%

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Whether the findings of this research are more compelling to the individual reader as expressed in correlation and regression coefficients or as illustrated by more concrete statistical norms and specific school examples, the conclusions are clear.

Despite other advantages—or obstacles—in the school or its community, more students achieve higher levels of reading excellence if their schools have strong library media (LM) programs.

Conclusions

Colorado Student Assessment Program (CSAP) reading scores increase with increases in the following characteristics of library media (LM) programs: LM program development, information technology, teacher/library media specialist (LMS) collaboration, and individual visits to the library media center (LMC). In addition, as participation increases in leadership roles, so does collaboration between teachers and LMSs. The relationship between these factors and test scores is not explained away by other school or community conditions. (See Figures 1 and 2, pp. 10-11)

Library Media Program Development

CSAP reading test scores increase with increases in:

- LMS hours per 100 students (7th grade),
- total staff hours per 100 students,
- print volumes per student,
- periodical subscriptions per 100 students,
- electronic reference titles per 100 students (7th grade),and
- library media expenditures per student.

Information Technology

Where networked computers link library media centers with classrooms, labs, and other instructional sites, students earn higher CSAP reading test scores. These higher scores are particularly linked to the numbers of computers enabling teachers and students to utilize:

- LMC resources, either within the LMC or networked to the LMC,
- licensed databases, and
- Internet/World Wide Web.

Collaboration

A central finding of this study is the importance of a collaborative approach to information literacy. Test scores rise in both elementary and middle schools as library media specialists and teachers work together. In addition, scores also increase with the amount of time library media specialists spend as in-service trainers of other teachers, acquainting them with the rapidly changing world of information.

Test scores increase as library media specialists spend more time:

- planning cooperatively with teachers (7th grade),
- identifying materials for teachers,
- teaching information literacy skills to students,
- providing in-service training to teachers,
- managing a computer network through which the library media program reaches beyond its own walls to classrooms, labs, and offices (7th grade).

Flexible Scheduling

Students have greater freedom in middle school, and are often able to choose whether or not they visit their school's LMC and use the resources there or take them home. Choosing to visit the LMC as an individual, separate from a class visit, is also a strong indicator of higher test scores. Middle schools with high test scores tend to have LMCs that report a high number of individual visits to the LMC on a per student basis.

Indirect Effects

While not having a direct effect on test scores, leadership involvement on the part of the library media specialist (LMS) has a strong impact on whether or not the LMS is working closely with teachers and students. At both elementary and middle school levels, the more the LMS is involved in school and library media professional activities, the higher the level of collaboration. Collaboration, in turn, does have a direct impact on test scores.

Higher levels of collaboration result from:

- meeting regularly with school administration,
- serving on standards and curriculum committees,
- working with faculty at school-wide staff meetings,
- and meeting with library media staff at the building level.

At the elementary level, library media program development (levels of staffing, collections and expenditures) and technology are strong predictors of each other as well as of test scores. The seventh grade level sees a strong relationship between library media program development and flexible scheduling.

School & Community Differences

These predictors of academic achievement cannot be explained away by:

- school differences, including:
    - school district expenditures per pupil,
    - teacher/pupil ratio,
    - the average years of experience of classroom teachers, and
    - their average salaries; or
- community differences, including:
    - adult educational attainment,
    - children in poverty, and
    - racial/ethnic demographics.

How much will a school's test scores improve with specific improvements in its library media program? The answer depends on the library media (LM) program's current status, what it improves, and how much it is improved. When LM predictors are maximized (e.g., staffing, expenditures, and information resources and technology), CSAP reading scores tend to run 18 percent higher in fourth grade and 10 to 15 percent higher in seventh.

A strong LM program is one

- that is adequately staffed, stocked and funded. Minimally, this means one full-time library media specialist (LMS) and one full-time aide. The relationship, however, is incremental; as the staffing, collections and funding of LM programs grow, reading scores rise.
- whose staff are actively involved leaders in their school's teaching and learning enterprise. A successful LMS is one who has the ear and support of the principal, serves with other teachers on the school's standards and curriculum committees, and holds regular meetings of the LM staff. Students succeed where the LMS participates with classroom teachers and administrators in making management decisions that encourage higher levels of achievement by every student.
- whose staff have collegial, collaborative relationships with classroom teachers. A successful LMS is one who works with a classroom teacher to identify materials that best support and enrich an instructional unit, is a teacher of essential information literacy skills to students, and, indeed, is

a provider of in-service training opportunities to classroom teachers. Students succeed where the LMS is a consultant to, a colleague with, and a teacher of other teachers.

- that embraces networked information technology. The library media center of today is no longer a destination; it is a point of departure for accessing the information resources that are the essential raw material of teaching and learning. Computers in classrooms, labs and other school locations provide networked access to information resources—the library catalog, electronic full text, licensed databases, locally mounted databases, and the Internet. Students succeed where the LM program is not a place to go, apart from other sites of learning in the school, but rather an integral part of the educational enterprise that reaches out to students and teachers where they are.

Recommendations for Action

The findings of this study recommend five specific actions by Colorado school decision-makers:

- Library media programs should have **funding for adequate professional and support staff, information resources, and information technology**. Such conditions are necessary if not sufficient alone to generate higher levels of academic achievement.
- **Library media specialists** must assert themselves as **leaders** in their schools. It is their responsibility to take the initiative required for **information literacy** to become an **integral part of the schools' approaches to both standards and curriculum**.
- Principals can do much to make this possible, including adopting **policies and practices** and communicating **expectations** that encourage **LM specialists** to act as professional educators and **classroom teachers** to accept them as **colleagues**.
- The library media program cannot be limited to the library media center as a place. Just as LMSs must involve themselves in the design and delivery of instruction, **information technology** must be used to make information resources **available to teachers and students wherever they may be** in the school.
- While Internet access is important, the LMS has an important role to play in ensuring that teachers and students have access to **high-quality licensed databases** from which current, authoritative information may be obtained. Library media specialists can provide **the necessary training** to ensure teachers and students know how to use the information tools and assess an information resource.

Appendices

Bibliography

List of Participants

Survey of School Library Media Centers in Colorado 1999

How School Librarians Help Kids Achieve Standards (brochure)

Proof of the Power: A First Look at the Colorado Study ... and More!
    FAST FACTS
    PowerPoint Slides

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List of Participants

School Name	District	County
AKRON ELEMENTARY SCHOOL	AKRON R-1	WASHINGTON
ANTELOPE TRAILS ELEM SCHOOL	ACADEMY 20	EL PASO
ARAGON MIDDLE SCHOOL	FOUNTAIN 8	FOUNTAIN
ARROWHEAD ELEMENTARY SCHOOL	CHERRY CREEK 5	ARAPAHOE
ASPEN MIDDLE SCHOOL	ASPEN 1	PITKIN
BAKER MIDDLE SCHOOL	DENVER COUNTY 1	DENVER
BASALT MIDDLE SCHOOL	ROARING FORK RE-	GARFIELD
BLEVINS JUNIOR HIGH SCHOOL	POUDRE R-1	LARIMER
BOLTZ JUNIOR HIGH SCHOOL	POUDRE R-1	LARIMER
BRADFORD PRIMARY	JEFFERSON COUNTY R-1	JEFFERSON
BURLINGTON ELEMENTARY SCHOOL	BURLINGTON RE-	KIT CARSON
BURLINGTON ELEMENTARY SCHOOL	ST VRAIN VALLEY RE	BOULDER
BURLINGTON MIDDLE SCHOOL	BURLINGTON RE-	KITCARSON
CACHE LA POUDRE ELEM SCHOOL	POUDRE R-1	LARIMER
CANON CITY MIDDLE SCHOOL	CANON CITY RE-	FREMONT
CARSON MIDDLE SCHOOL	FOUNTAIN 8	EL PASO
CEDAREDGE MIDDLE SCHOOL	DELTA COUNTY 50(	DELTA
CENTAURI MIDDLE SCHOOL	NORTH CONEJOS RE-	CONEJOS
CENTENNIAL ELEMENTARY SCHOOL	GREELEY 6	WELD
CENTENNIAL ELEMENTARY SCHOOL	NORTHGLENN-THORNTON 12	ADAMS
CENTENNIAL MIDDLE SCHOOL	BOULDER VALLEY RE	BOULDER
CHALLENGER MIDDLE SCHOOL	ACADEMY 20	EL PASO
CHAPPELOW MIDDLE SCHOOL	GREELEY 6	WELD
CHATFIELD ELEMENTARY SCHOOL	MESA COUNTY VALLEY 51	MESA
CHEYENNE MTN JR HIGH SCHOOL	CHEYENNE MOUNTAIN 12	EL PASO
COLUMBIAN ELEMENTARY SCHOOL	LAS ANIMAS RE-	BENT
COLUMBINE ELEMENTARY SCHOOL	DENVER COUNTY 1	DENVER
COLUMBINE ELEMENTARY SCHOOL	ST VRAIN VALLEY RE	BOULDER
CONRAD BALL MIDDLE SCHOOL	THOMPSON R-2	LARIMER
CORWIN MIDDLE SCHOOL	PUEBLO CITY 60	PUEBLO
CREIGHTON MIDDLE SCHOOL	JEFFERSON COUNTY R-1	JEFFERSON
CREST VIEW ELEMENTARY SCHOOL	BOULDER VALLEY RE	BOULDER
CRESTED BUTTE COMMUNITY SCHOO	GUNNISON WATERSHED RE1	GUNNISON
DOS RIOS ELEMENTARY SCHOOL	MESA COUNTY VALLEY 51	MESA
DOUGLASS ELEMENTARY SCHOOL	BOULDER VALLEY RE	BOULDER
DOUGLASS VALLEY ELEM SCHOOL	ACADEMY 20	EL PASO
DOULL ELEMENTARY SCHOOL	DENVER COUNTY 1	DENVER
EAGLE VALLEY ELEMENTARY	EAGLE COUNTY RE	EAGLE
EAGLEVIEW MIDDLE SCHOOL	ACADEMY 20	EL PASO
EAST MIDDLE SCHOOL	ADAMS-ARAPAHOE 28J	ARAPAHOE
EAST MIDDLE SCHOOL	MESA COUNTY VALLEY 51	MESA
EASTRIDGE COMMUNITY ELEM SCHL	CHERRY CREEK 5	ARAPAHOE
EATON MIDDLE SCHOOL	EATON RE-	WELD
EDITH TETER ELEMENTARY SCHOOL	PARK COUNTY RE-	PARK
EGNAR MIDDLE SCHOOL	DOLORES COUNTY RE	DOLORES
ELIZABETH MIDDLE SCHOOL	ELIZABETH C-1	ELBERT
ELLICOTT ELEMENTARY SCHOOL	ELLICOTT 22	EL PASO
EMERSON MIDDLE SCHOOL	COLORADO SPRINGS 11	EL PASO
ERIE ELEMENTRAY SCHOOL	ST VRAIN VALLEY RE	BOULDER
ESCALANTE MIDDLE SCHOOL	DURANGO 9-R	LA PLATA
EVANS ELEMENTARY SCHOOL	ALAMOSA RE-	ALAMOSA

School Name	District	County
EVERITT MIDDLE SCHOOL	JEFFERSON COUNTY R-1	JEFFERSON
EYESTONE ELEMENTARY SCHOOL	POUDRE R-1	LARIMER
FALCON ELEMENTARY SCHOOL	FALCON 49	EL PASO
FALCON MIDDLE SCHOOL	FALCON 49	EL PASO
FIRESIDE ELEMENTARY SCHOOL	BOULDER VALLEY RE	BOULDER
FLORIDA MESA ELEM SCHOOL	DURANGO 9-R	LA PLATA
FOOTHILL ELEMENTARY SCHOOL	BOULDER VALLEY RE	BOULDER
FOOTHILLS ELEMENTARY SCHOOL	ACADEMY 20	EL PASO
FRANKLIN ELEMENTARY SCHOOL	LITTLETON 6	ARAPAHOE
FREDERICK ELEMENTARY SCHOOL	ST VRAIN VALLEY RE	BOULDER
FRUITA MIDDLE SCHOOL	MESA COUNTY VALLEY 51	MESA
GLENWOOD SPRINGS ELEM SCHOOL	ROARING FORK RE-	GARFIELD
GLENWOOD SPRINGS MIDDLE SCH	ROARING FORK RE-	GARFIELD
GODDARD MIDDLE SCHOOL	LITTLETON 6	ARAPAHOE
GRANBY ELEMENTARY SCHOOL	EAST GRAND 2	GRAND
GRAND LAKE ELEMENTARY SCHOOL	EAST GRAND 2	GRAND
GRANT MIDDLE SCHOOL	DENVER COUNTY 1	DENVER
GREEN ACRES ELEMENTARY SCHOOL	FORT MORGAN RE-	MORGAN
GUNNISON ELEMENTARY SCHOOL	GUNNISON WATE	GUNNISON
GUNNISON MIDDLE SCHOOL	GUNNISON WATE	GUNNISON
GUST ELEMENTARY SCHOOL	DENVER COUNTY 1	DENVER
HASKIN ELEMENTARY SCHOOL	CENTER 26	SAGUACHE
HAXTUN ELEMENTARY SCHOOL	HAXTUN RE-	PHILLIPS
HEATHERWOOD ELEMENTARY SCHOOL	BOULDER VALLEY RE	BOULDER
HERITAGE MIDDLE SCHOOL	ST VRAIN VALLEY RE	BOULDER
HIGH PLAINS ELEMENTARY SCHOOL	ACADEMY 20	EL PASO
HIGH PLAINS ELEMENTARY SCHOOL	CHERRY CREEK 5	ARAPAHOE
HIGHLAND ELEMENTARY SCHOOL	LITTLETON 6	ARAPAHOE
HOLMES MIDDLE SCHOOL	COLORADO SPRINGS 11	EL PASO
HUDSON ELEMENTARY SCHOOL	KEENESBURG RE-	WELD
HUNTERS GLEN ELEMENTARY SCHOO	NORTHGLENN-THORNTON 12	ADAMS
HYGIENE ELEMENTARY SCHOOL	ST VRAIN VALLEY RE	BOULDER
INDIAN RIDGE ELEM SCHOOL	CHERRY CREEK 5	ARAPAHOE
JANITELL JUNIOR HIGH SCHOOL	WIDEFIELD 3	EL PASO
JEFFERSON ELEMENTARY SCHOOL	COLORADO SPRINGS 11	EL PASO
JOHN DEWEY JUNIOR HIGH SCHOOL	MAPLETON 1	ADAMS
KEARNEY MIDDLE SCHOOL	ADAMS COUNTY 14	ADAMS
KEMPER ELEMENTARY SCHOOL	MONTEZUMA-CORTEZ RE-	MONTEZUMA
KIOWA ELEM SCHOOL	KIOWA C-2	ELBERT
LA JARA ELEMENTARY SCHOOL	NORTH CONEJOS RE-	CONEJOS
LAKE MIDDLE SCHOOL	DENVER COUNTY 1	DENVER
LAMAR MIDDLE SCHOOL	LAMAR RE-	PROWERS
LAREDO MIDDLE SCHOOL	CHERRY CREEK 5	ARAPAHOE
LAS ANIMAS MIDDLE SCHOOL	LAS ANIMAS RE-	BENT
LASLEY ELEMENTARY SCHOOL	JEFFERSON COUNTY R-1	JEFFERSON
LEAWOOD ELEMENTARY SCHOOL	JEFFERSON COUNTY R-1	JEFFERSON
LESHER JUNIOR HIGH SCHOOL	POUDRE R-1	LARIMER
LEWIS-PALMER MIDDLE SCHOOL	LEWIS-PALMER 38	EL PASO
LINCOLN ELEMENTARY SCHOOL	CANON CITY RE-	FREMONT
LINCOLN O M ELEMENTARY SCHOOL	MESA COUNTY VALLEY 51	MESA
LINTON ELEMENTARY SCHOOL	POUDRE R-1	LARIMER
LOIS LENSKI ELEMENTARY SCHOOL	LITTLETON 6	ARAPAHOE
LONGFELLOW ELEMENTARY SCHOOL	SALIDA R-3	CHAFFEE
LONGS PEAK MIDDLE SCHOOL	ST VRAIN VALLEY RE	BOULDER

School Name	District	County
LOUISVILLE MIDDLE SCHOOL	BOULDER VALLEY RE	BOULDER
LUKAS ELEMENTARY SCHOOL	JEFFERSON COUNTY R-1	JEFFERSON
LYONS ELEMENTARY SCHOOL	ST VRAIN VALLEY RE	BOULDER
MADISON ELEMENTARY SCHOOL	GREELEY 6	WELD
MALLEY DRIVE ELEMENTARY SCHOO	NORTHGLENN-THORNTON 12	ADAMS
MANASSA ELEMENTARY SCHOOL	NORTH CONEJOS RE-	CONEJOS
MANAUGH ELEMENTARY SCHOOL	MONTEZUMA-CORTEZ RE-	MONTEZUMA
MANITOU SPRINGS ELEM SCHOOL	MANITOU SPRINGS 14	EL PASO
MANITOU SPRINGS MIDDLE SCHOOL	MANITOU SPRINGS 14	EL PASO
MARTIN LUTHER KING MIDDLE	DENVER COUNTY 1	DENVER
MCGRAW ELEMENTARY SCHOOL	POUDRE R-1	LARIMER
MEAD ELEMENTARY SCHOOL	ST VRAIN VALLEY RE	BOULDER
MEAD MIDDLE SCHOOL	ST VRAIN VALLEY RE	BOULDER
MEEKER ELEMENTARY SCHOOL	MEEKER RE1	RIO BLANCO
MOORE ELEMENTARY SCHOOL	POUDRE R-1	LARIMER
MORTON ELEMEMTARY SCHOOL	PUEBLO CITY 60	PUEBLO
MOUNTAIN VIEW ELEM SCHOOL	ST VRAIN VALLEY RE	BOULDER
MOUNTAIN VIEW ELEM SCHOOL	WINDSOR RE	WELD
MT GARFIELD MIDDLE SCHOOL	MESA COUNTY VALLEY 51	MESA
MT VIEW CORE KNOWLEDGE CHARTE	CANON CITY RE-	FREMONT
NEEDHAM ELEMENTARY SCHOOL	DURANGO 9-R	LA PLATA
NEVIN PLATT MIDDLE SCHOOL	BOULDER VALLEY RE	BOULDER
NIWOT ELEMENTARY SCHOOL	ST VRAIN VALLEY RE	BOULDER
NORTH ARVADA MIDDLE SCHOOL	JEFFERSON COUNTY R-1	JEFFERSON
NORTH MIDDLE SCHOOL	COLORADO SPRINGS 11	EL PASO
NORTH MOR ELEMENTARY SCHOOL	NORTHGLENN-THORNTON 12	ADAMS
NORTHGLENN MIDDLE SCHOOL	NORTHGLENN-THORNTON 12	ADAMS
NORTHRIDGE ELEMENTARY SCHOOL	ST VRAIN VALLEY RE	BOULDER
NUCLA ELEMENTARY SCHOOL	WEST END RE-	MONTROSE
O'DEA ELEMENTARY SCHOOL	POUDRE R-1	LARIMER
ORTEGA MIDDLE SCHOOL	ALAMOSA RE-	ALAMOSA
OVERLAND TRAIL MIDDLE SCHOOL	BRIGHTON 27J	ADAMS
PAGOSA SPRINGS ELEM SCHOOL	ARCHULETA COUNTY 50	ARCHULETA
PAONIA ELEMENTARY SCHOOL	DELTA COUNTY 50(	DELTA
PARKVIEW ELEMENTARY SCHOOL	LAMAR RE-	PROWERS
PIONEER ELEMENTARY SCHOOL	FORT MORGAN RE-	MORGAN
PLACE MIDDLE SCHOOL	DENVER COUNTY 1	DENVER
PLEASANT VIEW MIDDLE SCHOOL	PUEBLO COUNTY RURAL 70	PUEBLO
PRAIRIE HILLS ELEM SCHOOL	ACADEMY 20	EL PASO
RIVERDALE ELEMENTARY	NORTHGLENN-THORNTON 12	ADAMS
ROCK RIDGE ELEMENTARY SCHOOL	DOUGLAS COUNTY RE	DOUGLAS
RONCALLI MIDDLE SCHOOL	PUEBLO CITY 60	PUEBLO
RUNNING CREEK ELEM SCHOOL	ELIZABETH C-1	ELBERT
SABIN ELEMENTARY SCHOOL	DENVER COUNTY 1	DENVER
SAGEBRUSH ELEM SCHOOL	CHERRY CREEK 5	ARAPAHOE
SAMUELS ELEMENTARY SCHOOL	DENVER COUNTY 1	DENVER
SARGENT ELEMENTARY SCHOOL	SARGENT RE-	RIO GRANDE
SEVENTH STREET ELEM SCHOOL	DOLORES COUNTY RE	DOLORES
SHANNER ELEMENTARY SCHOOL	HOLLY RE-	PROWERS
SHAW HEIGHTS MIDDLE SCHOOL	WESTMINSTER 50	ADAMS
SHAWSHEEN ELEMENTARY SCHOOL	GREELEY 6	WELD
SHELLEDY ELEMENTARY SCHOOL	MESA COUNTY VALLEY 51	MESA
SIERRA ELEMENTARY SCHOOL	JEFFERSON COUNTY R-1	JEFFERSON
SINGING HILLS ELEMENTARY SCHO	ELIZABETH C-1	ELBERT

School Name	District	County
SOUTH ROUTT ELEMENTARY SCHOOL	SOUTH ROUTT RE	ROUTT
SPANGLER ELEMENTARY SCHOOL	ST VRAIN VALLEY RE	BOULDER
SPRINGFIELD ELEMENTARY SCHOOL	SPRINGFIELD RE-	BACA
SPROUL JUNIOR HIGH SCHOOL	WIDEFIELD 3	EL PASO
STEAMBOAT SPRINGS JUNIOR HIGH	STEAMBOAT SPRINGS RE-	ROUTT
STERLING MIDDLE SCHOOL	VALLEY RE-	LOGAN
STEVENS ELEMENTARY SCHOOL	VALLEY RE-	LOGAN
STONY CREEK ELEMENTRY	JEFFERSON COUNTY R-1	JEFFERSON
STRATTON ELEMENTARY SCHOOL	STRATTON R-4	KIT CARSON
SUMMIT COVE ELEMENTARY SCHOOL	SUMMIT RE-	SUMMIT
SUMMIT VIEW ELEMENTARY SCHOOL	DOUGLAS COUNTY RE	DOUGLAS
SUNNYSIDE ELEMENTARY SCHOOL	DURANGO 9-R	LA PLATA
SUNSET MIDDLE SCHOOL	ST VRAIN VALLEY RE	BOULDER
TELLURIDE ELEMENTARY SCHOOL	TELLURIDE R-1	SAN MIGUEL
TELLURIDE MIDDLE SCHOOL	TELLURIDE R-1	SAN MIGUEL
THORNTON MIDDLE SCHOOL	NORTHGLENN-THORNTON 12	ADAMS
TIMBERVIEW MIDDLE SCHOOL	ACADEMY 20	EL PASO
TIMNATH ELEMENTARY SCHOOL	POUDRE R-1	LARIMER
TRAILS WEST ELEMENTARY SCHOOL	CHERRY CREEK 5	ARAPAHOE
TRUSCOTT ELEMENTARY SCHOOL	THOMPSON R-2	LARIMER
TWAIN ELEMENTARY SCHOOL	LITTLETON 6	ARAPAHOE
UPPER BLUE ELEMENTARY SCHOOL	SUMMIT RE-	SUMMIT
UTE MEADOWS ELEMENTARY SCHOOL	JEFFERSON COUNTY R-1	JEFFERSON
VASSAR ELEMENTARY SCHOOL	ADAMS-ARAPAHOE 28J	ARAPAHOE
VIKAN MIDDLE SCHOOL	BRIGHTON 27J	ADAMS
W H HEATON MIDDLE SCHOOL	PUEBLO CITY 60	PUEBLO
WEBBER JUNIOR HIGH SCHOOL	POUDRE R-1	LARIMER
WELLINGTON JUNIOR HIGH SCHOOL	POUDRE R-1	LARIMER
WERNER ELEMENTARY SCHOOL	POUDRE R-1	LARIMER
WEST ELEMENTARY SCHOOL	EAST OTERO R-1	OTERO
WEST INTERGENERATIONAL CENTER	COLORADO SPRINGS 11	EL PASO
WEST JEFFERSON MIDDLE SCHOOL	JEFFERSON COUNTY R-1	JEFFERSON
WEST MIDDLE SCHOOL	ADAMS-ARAPAHOE 28J	ARAPAHOE
WESTGATE ELEMENTARY SCHOOL	JEFFERSON COUNTY R-1	JEFFERSON
WESTRIDGE ELEMENTARY SCHOOL	JEFFERSON COUNTY R-1	JEFFERSON
WESTVIEW ELEMENTARY SCHOOL	NORTHGLENN-THORNTON 12	ADAMS
WESTVIEW MIDDLE SCHOOL	ST VRAIN VALLEY RE	BOULDER
WHEAT RIDGE MIDDLE SCHOOL	JEFFERSON COUNTY R-1	JEFFERSON
WILDER ELEMENTARY SCHOOL	LITTLETON 6	ARAPAHOE
WILLOW CREEK ELEM SCHOOL	CHERRY CREEK 5	ARAPAHOE
ZERGER ELEMENTARY SCHOOL	JEFFERSON COUNTY R-1	JEFFERSON

Survey of School Library Media Centers in Colorado 1999

Direct questions to:

Keith Lance
Email: klance@sni.net
voice 303/866-6900 - fax 303/866-6940

SAMPLE QUESTIONNAIRE
Do Not Complete or Return

DUE DATE: XXX XX, 1999

Return the completed questionnaire in the accompanying postage-paid envelope or address your own envelope to: PA SL SURVEY - Louise Conner, Library Research Service, XXX E. XXXXXX Ave., Denver, CO XXXXX-1799.

Extra copies of this questionnaire are available at http://www.lrs.org. Click on Special Projects under ABOUT LRS and scroll to The Impact of Colorado School Libraries on Academic Achievement.

PART I - RESPONDENT INFORMATION

Please identify your school by name, level, and district and provide contact information for the individual who responded to this survey. Complete a separate questionnaire for each school. (Do not combine data for multiple schools.)

School Name				
School Level (Mark one)	☐ Elementary	☐ Jr High/Middle	☐ High	☐ Combined
Grades in School (circle all that apply) preK K 1 2 3 4 5 6 7 8 9 10 11 12				
District Name	Intermediate Unit			
School Address				
City	County	Zip code		
Name of Respondent	Title			
Phone ( )	Fax ( )	E-mail:		

PART II - SERVICE HOURS PER TYPICAL WEEK

Please report the typical weekly number of hours this school library is open for use. Report hours during school, before and after school hours, and during the summer.

Item	*Line*	*Hours per Typical Week*
Hours open per typical school week during school hours	1	
Hours open per typical school week before school hours	2	
Hours open per typical school week after school hours	3	
Hours open per typical summer week	4	

PART III - SCHOOL LIBRARY STAFFING PER TYPICAL WEEK

Please report the level of staffing for this school library program—first by education and selected other credentials, then by classification. Include both the number of persons in each type of position and the total number of person-hours per typical week for each staff type (i.e., the sum of the typical weekly hours for staff of each type). Do not report more than 40 hours per week per person in each table. Count each individual only once per table. (Optional items regarding extra hours appear later in this questionnaire.)

Example: If two persons are reported as other paid staff on line III 4 (a) and one works 20 hours per week and the other 10, enter 30 on line III 4 (b).

Paid Staff by Education and Selected Other Credentials	*Line*	*Number of Persons (head count, not FTE) (a)*	*Total Person-Hours per Typical Week (b)*
Master's degree or higher --with teacher & library science certification	1		
--with teacher certification only	2		
--with teacher certification and/or other state credential(s)--specify:	3		
--with neither teacher certification nor other state credentials	4		
Bachelor's degree --with teacher & library science certification	5		
--with teacher certification only	6		
--with teacher certification and/or other state credential(s)--specify:	7		
--with neither teacher certification nor other state credentials	8		
Less than Bachelor's degree	9		
TOTAL PAID STAFF (Sum of lines III 1-9)	**10**		

SAMPLE QUESTIONNAIRE – *Do Not Complete or Return*

Volunteer Type	*Line*	*Number of Persons (head count, not FTE) (a)*	*Total Person-Hours per Typical Week (b)*
Adult volunteers	11		
Student workers	12		
TOTAL VOLUNTEER WORKERS (Sum of lines III 11-12)	**13**		

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PART IV – SELECTED PAID STAFF ACTIVITIES PER TYPICAL WEEK

Library staff engage in a wide variety of activities each week. Some of these activities are completed during regular business hours, but others are only completed because staff agree or volunteer to work extra hours. For each of the following activities, please report (estimating, if necessary) the number of hours per typical week spent on each activity. NOTE: The "non-contract" column is optional. If "non-contract" (i.e., extra) hours are not put in on a weekly basis, please estimate for a month and divide by four or estimate for a year and divide by the number of weeks per year the library is open.

SAMPLE QUESTIONNAIRE *Do Not Complete or Return*	*Person-Hours Per Typical Week*		
Selected Activities	*Line*	*Con-tract Hours (a)*	*OPTIONAL Non-contract Hours (b)*
Learning & Teaching Hours spent weekly planning instructional units with teachers	1		
Hours spent weekly teaching cooperatively with teachers	2		
Hours spent weekly providing in-service training to teachers and/or other school staff	3		
Hours spent weekly meeting with building or district standards committees/teams/task forces	4		
Hours spent weekly serving on building or district curriculum committees	5		
Hours spent weekly assisting teachers (individually or in groups) in accessing and/or utilizing standards-related information	6		
Information Access & Delivery Hours spent weekly identifying materials for instructional units developed by teachers	7		
Hours spent weekly providing information skills instruction to individuals or groups (e.g., citations, copyright/plagiarism, critical thinking, evaluating Internet sources, note-taking)	8		
Hours spent weekly offering reading incentive activities (e.g., reader's advisory services, book talks, story times, author visits, puppet shows)	9		
Hours spent weekly performing basic library functions (e.g., processing, retrieving, checking in and out, re-shelving/re-storing materials/equipment)	10		
Program Administration Hours spent weekly managing computers/library automation/computer network	11		
Hours spent weekly in meetings of building and/or district school library staff	12		
Hours spent weekly meeting with other school library staff from beyond your own building and district	13		
Hours spent weekly meeting with principal and/or other building or district administrators	14		
Hours spent weekly attending general faculty and/or staff meetings	15		
Extra duties unrelated to school library services (e.g., monitoring restrooms, lunch, buses, recess, etc.)	16		
All other paid staff hours weekly	17		
TOTAL PAID STAFF HOURS (Sum of lines IV 1-17) **Note: IV 18 (a) must equal III-10 (b): Total Person-Hours Per Typical Week for All Paid Staff**	**18**		

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PART V - SCHOOL LIBRARY USAGE PER TYPICAL WEEK

Please report the following types of usage of the school library program per typical week. If these figures must be estimated and it is easier to estimate them for a month or year, estimate for a month and divide by four; or for a year, divide by the number of weeks the school library is open annually.

Type of Usage	*Line*	*Number*
Visits to the school library (scheduled or unscheduled) by ■ Individuals (students, teachers, administrators, parents, others)	1a	
■ Classes or other groups (e.g., groups of teachers, administrators, parents, or other school visitors)	1b	
Information skills instruction contacts (scheduled or unscheduled) ■ Individuals (students, teachers, administrators, parents, others)	2a	
■ Classes or other groups (e.g., groups of teachers, administrators, parents, or other school visitors)	2b	
Circulation of materials (include all formats)	3	
In-library use of materials (estimate based on reshelving count)	4	
Intra-district loans (i.e., loans of materials between one building and another within the same school district, including items obtained from district collections)		
■ Items provided to other buildings	5a	________
■ Items received from other buildings and district collections	5b	________
Access PA loans (i.e., loans of materials between this school library and other libraries of any type outside its school district and items obtained from document delivery services)		
■ Items provided to other buildings	6a	________
■ Items received from other buildings	6b	________

SAMPLE QUESTIONNAIRE – *Do Not Complete or Return*

PART VI – SCHOOL LIBRARY TECHNOLOGY

Please report the total number of computers located in the school library as well as the number of those computers with each of the following features. For the total as well as each following category, distinguish the number of computers in your school that are located in or under the supervision of the school library and others from which networked library resources may be accessed. Do not include non-library computers from which networked library resources cannot be accessed. For this question, the terms "computer," "terminal," and "workstation" are considered synonymous. Computers under the supervision of the school library (e.g., in a separate computer lab) but not located in the same immediate space may be counted in column (a). Computers from which any networked school library resources may be accessed may be located in classrooms, a separately administered computer lab, mini-lab, administrative offices, or any other school space not under the supervision of the school library. Any particular computer should be counted only once in item VI 1a, but may be counted more than once in items VI 1b through VI 1n.

		Number of computers in school	
Number of computers	*Line*	*Located in or under supervision of school library (a)*	*From which any networked library resources may be accessed (b)*
TOTAL	1a		
Number of these ... ■ With Internet connection	1b		
■ On a local area network (LAN)	1c		
■ On a wide area network (WAN)	1d		
■ With access to the school library catalog	1e		
■ With access to school library databases (e.g., FirstSearch, SIRS)	1f		
■ With a menu option or bookmark for Access PA	1g		
■ With CD ROM drives	1h		
■ With networked access to CD ROM resources	1I		
■ That can display text only	1j		
■ That can display graphics (World Wide Web)	1k		
■ Connected to a modem or equivalent	1l		
■ Connected directly to or networked to a printer	1m		
■ With any accommodations for persons with disabilities (e.g., voice synthesizer, magnified screen)	1n		

For the total number of school library computers reported in VI 1a, identify the number of each of the following types:

Number of personal computers by processor speed	*Line*	*Number of PCs*	*Number of Macintosh microcomputers running*	*Line*	*Number of MACs*
Pentium or higher	2a		PowerMac or later	3a	
486	2b		System 7	3b	
386 or lower	2c		System 6 or earlier	3c	

SAMPLE QUESTIONNAIRE – *Do Not Complete or Return*

PART VI – SCHOOL LIBRARY TECHNOLOGY--continued

Considering all of the computers reported in VI 1a, mark the fastest Internet service connection speed available on any computer. Mark (X) one.

Maximum speed of Internet service connection					
Speed	*Line*	*Dial-Up*	*Speed*	*Line*	*Dedicated Line*
None	4a	☐	56k (via dedicated line)	4e	☐
14.4K or less	4b	☐	ISDN	4f	☐
28.8K	4c	☐	T-1	4g	☐
56K (via dial-up)	4d	☐	Other (frame relay, ADSL)	4h	☐

The following items seek a description of Internet access conditions and filtering practices affecting school library computers. Mark all that apply to the left. Mark one for each question to the right.

Internet access for students					
Conditions of Internet access	*Line*	*Response*	*Internet filtering*	*Line*	*Response*
Mark (X) all that apply					Mark (X) one
No restrictions	5a	☐	Internet access via pre-selected menu only	6a	☐ Yes ☐ No
With parental permission &/or acceptable use agreement	5b	☐	Student terminals filtered:		Mark (X) one
			■ None	7a	☐
Restricted by grade level (unrestricted from grade ____ up)	5c	☐	■ Some	7b	☐
			■ All	7c	☐
Other restriction(s)—please specify:	5d	☐	If any student terminals filtered:		Mark (X) one
			■ Decided at district level	8a	☐
			■ Decided at building level	8b	☐

SAMPLE QUESTIONNAIRE – *Do Not Complete or Return*

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PART VII - SCHOOL LIBRARY COLLECTION

Please report all holdings regardless of their circulation status (i.e., circulating and non-circulating items). Include only materials available for use by teachers and/or students. Exclude uncataloged materials reserved exclusively for use by school library staff or building administrators (e.g., principal, counselor, secretary). Report average copyright dates. If these figures cannot be obtained from an electronic catalog, pull a systematic random selection of 25 items in the category (e.g., one per range or section, every third item, an item from every fifth shelf) and average their copyright dates.

Item	*Line*	*Number*	*Average Copyright Year*
Print volumes	1		
Encyclopedias & reference titles on CD-ROM or laser disk	2		
Magazines & newspapers ■ Current print subscriptions to magazines	3a		**N/A**
■ Current print subscriptions to newspapers	3b		**N/A**
Video materials (cassettes and disks)	4		
Computer software packages for use in school library by students	5		
Does the school library subscribe to ■ Any online periodical services (e.g., FirstSearch, InfoTrac, UMI)?	6a	☐ YES	☐ NO
■ Any CD ROM services (e.g., SIRS, Gale's "Discovering..." series, NewsBank, SuperTOM)?	6b	☐ YES	☐ NO
■ Any other electronic full text services (e.g., E-library)?	6c	☐ YES	☐ NO

SAMPLE QUESTIONNAIRE – *Do Not Complete or Return*

PART VIII - ANNUAL OPERATING EXPENDITURES

Please report the annual operating expenditures for this school library program, including both funds from the school budget and funds obtained from other sources (e.g., grants, donations from parent-teacher organizations). Exclude major one-time capital outlays for computers, furniture, and other equipment.

Item	*Line*	*School Budget (1)*	*All Other Sources (2)*
Books and all other print materials (include magazines & newspapers)	1	.00	.00
Materials in electronic formats (e.g., software, CD-ROM, laser disk, locally-mounted databases)	2	.00	.00
Non-print materials (e.g., audio, video, microform)	3	.00	.00
Electronic access to information (e.g., online database searching, Internet access)	4	.00	.00
Other operating expenditures	5	.00	.00
TOTAL OPERATING EXPENDITURES (Sum of VIII 1-5)	**6**	**.00**	**.00**

PART IX - ANNUAL CAPITAL OUTLAY

Please report the annual capital outlay for this school library program, including the costs of computers, furniture, and other equipment.

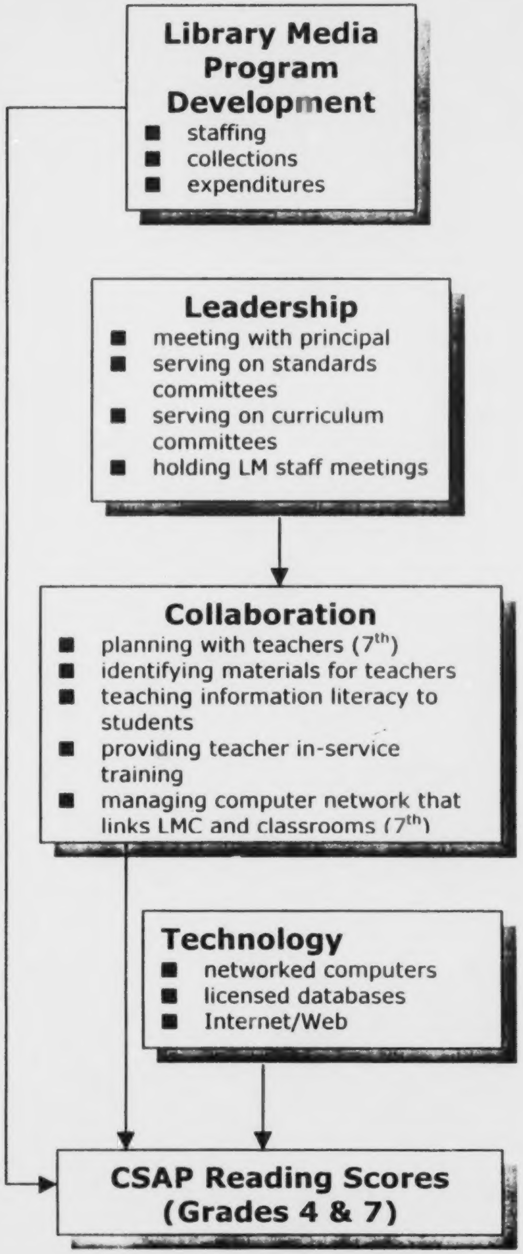
Item	*Line*	*School Budget (1)*	*All Other Sources (2)*
Equipment (e.g., computers, CD-ROM drives, VCRs)	1	.00	.00
Other capital purchases (e.g., furniture, shelving)	2	.00	.00
TOTAL CAPITAL OUTLAY (Sum of IX 1-2)	**3**	**.00**	**.00**

PART X - SCHOOL LIBRARY MANAGEMENT

Please answer each of the following questions—all simple YES/NO items.

Item	*Line*	*Response*	
Does the school library program receive a budget?	1	☐ YES	☐ NO
If YES, do school library staff submit a budget request?	2	☐ YES	☐ NO
Does the school library program have an advisory committee?	3	☐ YES	☐ NO
Do school library staff meet regularly with local public library staff?	4	☐ YES	☐ NO
Have there been any challenges (reconsiderations) of materials in your school library's collection during the past year?	5	☐ YES	☐ NO

SAMPLE QUESTIONNAIRE – *Do Not Complete or Return*



Library Media Program Development
- staffing
- collections
- expenditures

Leadership
- meeting with principal
- serving on standards committees
- serving on curriculum committees
- holding LM staff meetings

Collaboration
- planning with teachers (7th)
- identifying materials for teachers
- teaching information literacy to students
- providing teacher in-service training
- managing computer network that links LMC and classrooms (7th)

Technology
- networked computers
- licensed databases
- Internet/Web

CSAP Reading Scores (Grades 4 & 7)

Other School Library Impact Studies

For more information about recent research on the impact of school library media programs on academic achievement, visit the Library Research Service web site, http://www.lrs.org. Links are provided to:

- **The Impact of School Library Media Centers on Academic Achievement** (the original 1993 Colorado study),
- **Information Empowered**: *The School Librarian as an Agent of Academic Achievement in Alaska* (1999), and
- **Measuring Up to Standards**: *The Role of Library Information Programs & Information Literacy in Pennsylvania Schools*

Contact Information

Direct questions and comments about the Colorado study and requests for a speaker on this topic to:

Keith Curry Lance or Marcia J. Rodney
Library Research Service
201 E. Colfax Ave., Suite 309
Denver, CO 80203-1799
Tel.: 303-866-6737 - Fax: 303-866-6940
E-mail: klance@sni.net or mrodney@du.edu

Colorado State Board of Education
Seated January 12 1999

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How School Librarians Help Kids Achieve Standards

The Second Colorado Study

Keith Curry Lance
Library Research Service
Colorado State Library
Colorado Department of Education

Marcia J. Rodney
Library & Information Services Department
University of Denver

Christine Hamilton-Pennell
Library & Information Services Department
University of Denver &
Mosaic Knowledge Works

Colorado Student Assessment Program (CSAP) reading scores increase with improvements in library media programs. (Average percentage increases from lowest to highest rated LM programs: 4th/7th grade)

Schools with well-developed library media programs average 10-15%/18% higher reading scores. Well-developed programs are indicated by staffing level, collection size and age, and expenditures.

When library media staff collaborate with classroom teachers, reading scores average increases of 8%/18-21%. Key collaboration activities of library media staff are planning with teachers, teaching information literacy, and providing in-service training to teachers.

> The librarian presents lessons specifically geared to the Colorado State Standards. Through collaborative planning with teachers, each unit includes an assessment tool, such as a rubric made in consultation with each classroom or grade level.
>
> Madeline Wood, Library Media Specialist
> Samuels Elementary, Denver

When schools have computer networks that extend the library media program's reach into classrooms and labs, reading scores rise 18-25%. Such networks provide access to licensed databases and the World Wide Web.

When access to library media centers in scheduled flexibly, reading scores improve 13-22%. Flexible scheduling allows students to visit the LMC individually.

Collaboration activities are more likely to occur where the library media specialist is a school leader. She or he meets regularly with principal, serves on standards and curriculum committees, and holds library media staff meetings.

> Every grade level teacher meets and plans with our library media specialist to create and develop units that will improve student learning.
>
> Gaynell C. Lawrence, Principal
> Schmitt Elementary, Denver

These predictors of academic achievement cannot be explained away by school differences, such as per pupil spending, teacher-pupil ratio, and other teacher characteristics (experience, salaries). Likewise, these predictors are not explained away by community differences, such as high adult educational attainment and low numbers of poor and minority children.

> The Library Media Center has become the center of the school. It is central to what goes on in the classroom. It's a busy place. Students come before and after school to use resources. Throughout the day, teachers come with entire classes, send small groups to work with the library media specialist, or send individuals to find information they need. Teachers come alone during planning time or before or after school to meet with the library media specialist, find resources, use the Internet, etc.
>
> Phyllis Meyer
> Teacher—Technology Resources
> Baker Middle School
> Denver

FAST FACTS

Recent Statistics from the Library Research Service

ED3/110.10/No. 164 November 19, 1999

Proof of the Power

A First Look at the Results of the Colorado Study ... and More!

The Latest Statewide Studies

During 1998 and 1999, three statewide studies of the impact of school library media centers on academic achievement have been conducted. The forthcoming reports on these studies are:

- **Information Empowered: The School Librarian as an Agent of Academic Achievement in Alaska,**
- **Measuring Up to Standards: The Role of Library Information Programs & Information Literacy in Colorado Schools**, and
- **How School Librarians Help Kids Achieve Standards** (a.k.a. *the second Colorado study* or *Colorado II*).

The Information Power Model & Previous Research Findings

The Information Power model developed by the American Association of School Librarians (AASL) focuses on three major themes for library media (LM) programs—collaboration, leadership, and technology—and three major roles for library media specialists (LMSs)—learning and teaching, information access and delivery, and program administration.

The findings of previous research on this topic can be summarized by LMS role:

Learning & Teaching

Previous research demonstrates that academic achievement of K-12 students is higher where the LMS:

- is part of a planning/teaching team,
- teaches information literacy independently, and
- works one-to-one with students in a flexibly scheduled program.

Information Access & Delivery

Previous research also associates higher academic achievement with:

- a quality collection of books and other materials selected to support the school's curriculum and used by both teachers and students,
- state-of-the-art technology that is integrated into the learning/teaching and information-seeking processes, and
- cooperation between LMCs and other libraries, especially public libraries.

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Program Administration

Previous research has also established that higher academic achievement is associated with:

- LM programs that are staffed to play an integral role in the school (minimally, at least one LMS with at least one aide),
- principal support of the LM program and collaboration between classroom teachers and the LMS,
- information technology that extends the reach of the LM program into the school's classrooms and labs, and
- a well-organized, formally requested budget adequate to support these conditions.

Each of the three study reports will include a detailed analysis of the previous literature as well as an exhaustive bibliography.

Motivations for Further Research

With the above-mentioned facts well established by previous research, one might rightly ask why further research was necessary.

A prime motivation for the new studies was to confirm the findings of the original Colorado study, The Impact of School Library Media Centers on Academic Achievement. Both practitioners and policymakers want to know that those findings

- can be replicated using standards-based tests,
- hold up over time, and
- apply to other states.

In addition, all three of the new studies seek to expand on the original Colorado study by demonstrating the value of

- specific activities that define the LMS role,
- principal and teacher support,
- flexible scheduling, and
- technology as part of LM programs.

Samples

Between them the three new studies involve over 800 schools in three states, and the participating schools serve both elementary and secondary grades—both middle and high school levels.

The Alaska study includes 211 of the state's 461 schools—46 percent of the schools serving the three tested grades: 4, 8, and 11.

The Colorado study includes 435 of the state's 1,691 schools serving three tested grades: 5, 8, and 11. The 435 participating schools constitute an 87 percent response rate from a 500-case sample.

There are 200 schools in the new Colorado study. These participants constitute a 67 percent response rate from a 300-case sample of the state's 1,178 schools serving two tested grades: 4 and 7. (Statewide standards-based testing at the high school level has not yet begun.)

School Library Surveys

Alaska's school libraries were surveyed in Fall 1998. Counterpart surveys in Colorado and Colorado were conducted in Spring 1999. While there were some minor differences among these surveys, all three were based on Colorado's 1998 questionnaire, and all three addressed five common sets of issues:

- staffing levels,
- time spent on a variety of staff activities,
- collection holdings by format,
- usage levels, and
- available technology and its functionality.

Available Data

In addition to original data collection via the above-mentioned surveys, all three studies also relied heavily on available data, including:

- state reading test scores (various grades indicated above),
- community characteristics, such as its
  - level of adult educational attainment,
  - socio-economic differences (e.g., income levels, poverty status), and
  - racial/ethnic demography.
- school characteristics, such as
  - teacher-pupil ratio,
  - teacher characteristics (e.g., percent with master's degrees, average years of experience, average salary), and
  - student characteristics (e.g., racial/ethnic demography, those eligible for the National School Lunch Program-—an indicator of socio-economic status)

Successful Types of Library Media Predictors

Four major types of library media program data were found to be predictors of academic achievement in at least two, if not all three, states:

- level of LM program development (e.g., staffing level, collection size, program expenditures),
- staff activities related to the Information Power themes of leadership, collaboration, and technology,
- levels of LM program usage, and
- technology (e.g., school-wide networks providing access to licensed databases as well as the Internet/World Wide Web).

Alaska Findings

The Alaska study yielded five major predictors of academic achievement:

- level of librarian staffing,
- time spent by librarians
    - delivering information literacy instruction to students
    - planning cooperatively with teachers, and
    - providing in-service training to teachers.
- a collection development policy that addresses the issue of challenges or requests for reconsideration of materials,
- the potential for Internet connectivity (i.e., computers with modem capability and telecommunications lines), and
- a relationship with the local public library.

Notably, this study could only demonstrate the efficacy of librarians, because there were too few cases of schools with both a librarian and an aide.

See Figure 1 for a graphic representation of the relationships among these variables and academic achievement in Alaska.

Pennsylvania Findings

The Pennsylvania study also yielded five major predictors of academic achievement:

- the presence of both librarians and support staff,
- the level of library expenditures (excluding staff salaries),
- the presence of rich collections of print and electronic information resources (i.e., books, periodical subscriptions, CD-ROM reference titles),
- the extent to which technology is utilized to extend the library information center's reach into the school's classrooms and labs (e.g., ACCESS PENNSYLVANIA databases, other licensed databases, Internet/World Wide Web), and, pivotally,

- the extent to which information literacy is integrated in the school's approach to standards and curriculum (e.g., time spent by library information specialists meeting with principals; teaching cooperatively and independently; attending faculty, curriculum committee, and standards committee meetings; managing information technology).

See Figure 2 for a graphic representation of the relationships among these variables and academic achievement in Pennsylvania.

Colorado Findings

Five sets of predictors of academic achievement were yielded by the second Colorado study:

- library media program development,
- leadership,
- collaboration,
- technology, and
- flexible scheduling.

Library Media Program Development

As in the original Colorado study, a single factor encompasses all of the data about the library media program's level of development. Several characteristics of LM programs are strongly interrelated with each other, and, together, they constitute a positive, statistically significant predictor of academic achievement. A program's standing on this development factor is driven by

- the number of LMS and total staff per 100 students,
- the number of volumes per student as well as the number of print subscriptions and electronic reference titles per 100 students, and
- LM expenditures per student.

Leadership

One of the major themes of Information Power is leadership. Library media specialists who exhibit leadership are more likely to have a positive effect on academic achievement. In Colorado, indicators of such leadership include time spent by the LMS:

- meeting with the principal,
- serving on standards and curriculum committees, and
- holding meetings of LM staff, and
- participating in faculty meetings.

Collaboration

In Information Power, collaboration is billed above leadership, but the findings of this study indicate that leadership's impact on academic achievement is to be the prime mover behind collaboration with teachers. Where the LMS exhibits leadership, she or he is also more likely to:

- plan cooperatively with teachers,
- identify materials for teachers,
- teach information literacy to students,
- provide in-service training to teachers, and
- manage the computer network that links the LMC, classrooms, and labs.

Technology

One of the strategic mistakes of the original Colorado study was to collect data on numbers of computers in or under the jurisdiction of the LMC alone. Of course, many computers used in instruction are located in classrooms and labs, and this time they were not left out. The only stipulation on which computers to count beyond those in the LMC was that they had to be networked to LM resources, such as the library catalog, licensed databases, and the Internet/World Wide Web. Statistical indicators of the importance of this kind of technology and the LM program's role in it include:

- the number of computers per 100 students,
- the number of computers providing access to licensed databases per 100 students, and
- the number of Internet-accessible computers per 100 students.

Flexible Scheduling

Previous research indicates that students perform at higher levels when their access to the LMC is not limited to regularly scheduled class visits. Students should be free to visit the LMC as their learning needs dictate. Ideally, some of these visits would still be in whole class groups, but others would be as part of smaller groups and individually. In reality, a fairly common practice is to schedule classes for regular LMC visits to provide planning and meeting time for teachers. All too often, during these periods, the LMC staff are little more than babysitters. An interesting, unexpected finding of this study is that individual student visits to the LMC correlate with test scores, but group visits—at least, group visits of the sort most common now—do not.

See Figures 3 and 4 for graphic representations of the relationships between and among these predictors and academic achievement in Colorado. There are two figures in order to indicate differences in these relationships for grades 4 and 7.

Key Common Findings

While findings from the three states studied most recently vary somewhat, they share some key common findings:

- School library media specialists can and do exert a positive and significant effect on academic achievement.
- Principal support of the LM program and teacher collaboration with the LMS are critical to making the LM program an integral part of teaching and learning.
- For the LMS to be a pivotal player, support staff are essential. A professional LMS cannot do her or his job if tethered to the LMC.
- The LMS has a teaching role—both as a co-teacher of information literacy to students and as an in-service trainer of teachers.
- LM programs that contribute most strongly to academic achievement are those with the technology necessary to extend access to information resources beyond the LMC to classrooms and labs throughout the school.

Distinguishing Results

While the three studies share common findings, each also offers some distinguishing results.

- The Alaska study was the first to suggest the important role of the LMS as an information literacy teacher of students as well as an in-service training provider for teachers.
- The Colorado study demonstrates that the synergy of LM staff, collections, and technology is most powerful where there is an integrated, collaborative approach to teaching information literacy.
- The Colorado study reveals that the relationship between leadership and collaboration is critical. Classroom teachers are more willing to collaborate with the LMS if she or he has taken the initiative to become an assertive, involved leader in the school. In addition, this study provides additional evidence linking flexibly scheduled LM programs with higher levels of academic achievement.

Controlling for School & Community Differences

As in the original Colorado study, each of these studies confirms that the relationships described above are not explained away by other school differences, such as:

- teacher-pupil ratio,
- teacher or student characteristics, and
- per pupil expenditures.

Likewise, these relationships cannot be explained away by community differences, such as

- adult educational attainment,
- socio-economic differences (e.g., income levels, poverty status), and
- racial/ethnic demography.

Recommended Actions

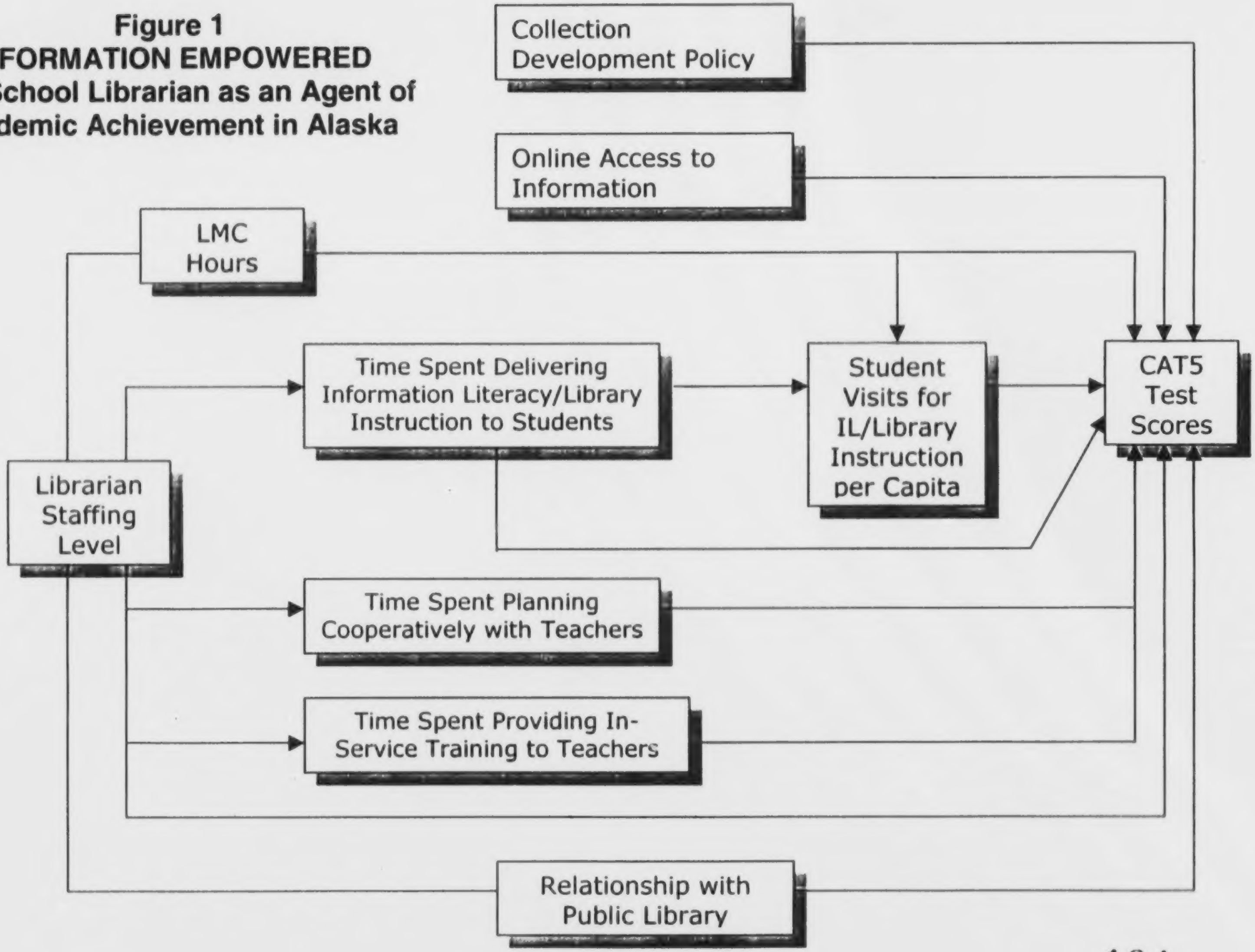
The combined weight of these three studies recommends several fairly obvious actions:

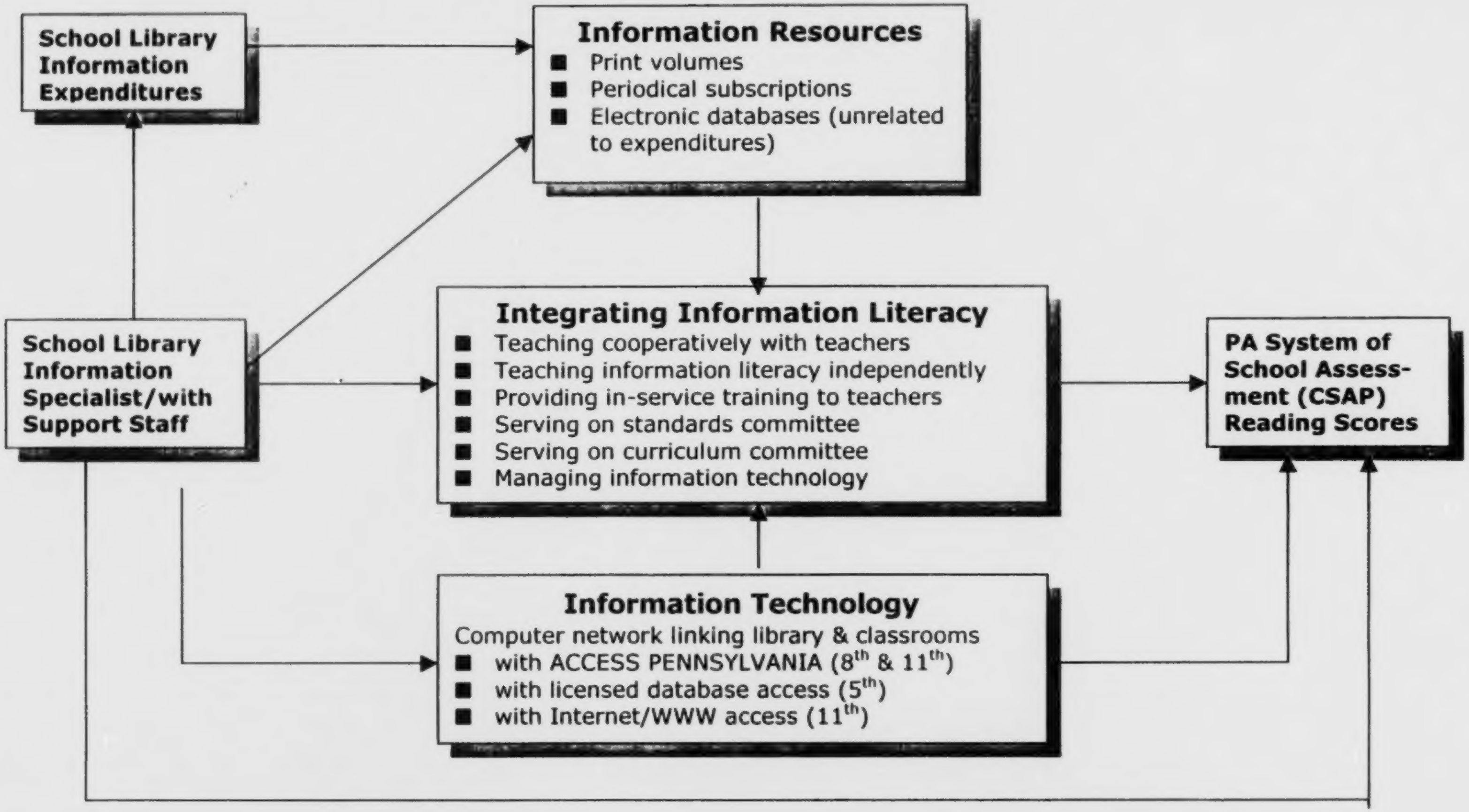
- Library media programs should be funded to have adequate professional and support staff, information resources, and information technology. Such conditions are necessary if not sufficient alone to generate higher levels of academic achievement.
- Library media specialists must assert themselves as leaders in their schools. Principals can do much to make this possible, including adopting policies and practices and communicating expectations that encourage LMSs to act as professional educators and classroom teachers to accept them as colleagues.
- The library media program cannot be limited to the library media center as a place. Just as LMSs must involve themselves in the design and delivery of instruction, technology must be used to make information resources available to teachers and students wherever they may be in the school.
- While Internet access is important, the LMS has an important role to play in ensuring that teachers and students have access to high-quality licensed databases from which current, authoritative information may be obtained.
- Wherever possible, schools should adopt policies of flexible scheduled access to the LMC. Available evidence indicates that LMCs that are reasonably accessible to students contribute more to academic achievement.

For More Information

For information about how to obtain copies of the reports for each of these studies, watch the Library Research Service web site, www.lrs.org, or contact the individual state library agencies. Also on the LRS web site, a PowerPoint presentation corresponding to this document is available. These slides were used in a session at the November 1999 joint conference of the American Association of School Librarians and the International Association for School Librarianship.

Figure 1
INFORMATION EMPOWERED
The School Librarian as an Agent of Academic Achievement in Alaska


Collection Development Policy
Online Access to Information
LMC Hours
Time Spent Delivering Information Literacy/Library Instruction to Students
Student Visits for IL/Library Instruction per Capita
CAT5 Test Scores
Librarian Staffing Level
Time Spent Planning Cooperatively with Teachers
Time Spent Providing In-Service Training to Teachers
Relationship with Public Library



School Library Information Expenditures

Information Resources

- Print volumes
- Periodical subscriptions
- Electronic databases (unrelated to expenditures)

School Library Information Specialist/with Support Staff

Integrating Information Literacy

- Teaching cooperatively with teachers
- Teaching information literacy independently
- Providing in-service training to teachers
- Serving on standards committee
- Serving on curriculum committee
- Managing information technology

PA System of School Assessment (CSAP) Reading Scores

Information Technology

Computer network linking library & classrooms

- with ACCESS PENNSYLVANIA (8th & 11th)
- with licensed database access (5th)
- with Internet/WWW access (11th)

Figure 2

MEASURING UP TO STANDARDS

The Role of Library Information Programs & Information Literacy in Pennsylvania Schools

Controlling for School Differences

- School expenditures per pupil
- Teacher characteristics (education, experience, salaries)
- Teacher/pupil ratio
- Student characteristics (race/ethnicity, poverty)

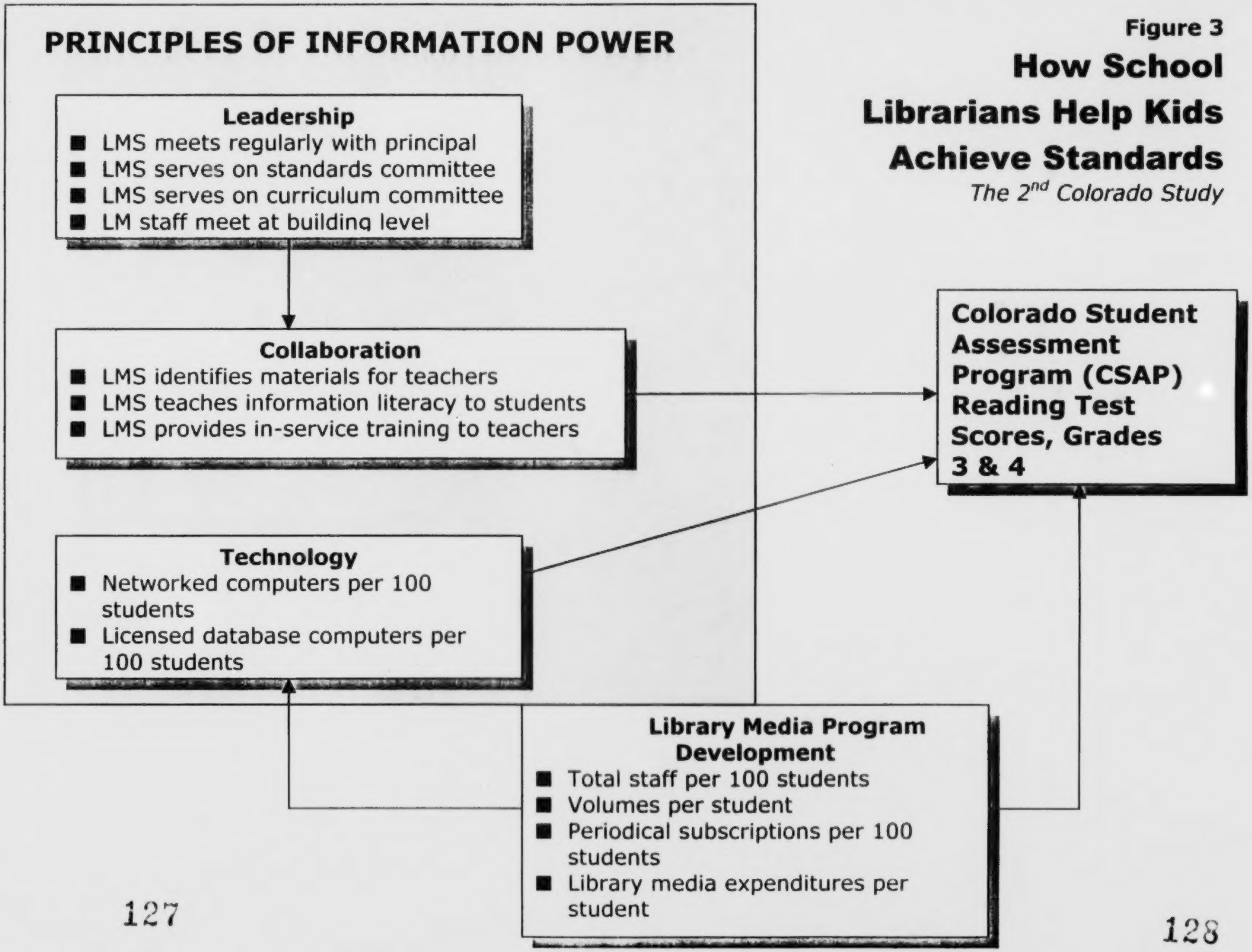
Controlling for Community Differences

- Adult educational attainment
- Race/ethnicity
- Families in poverty

Figure 3

How School Librarians Help Kids Achieve Standards

The 2nd Colorado Study



PRINCIPLES OF INFORMATION POWER

Leadership

- LMS meets regularly with principal
- LMS serves on standards committee
- LMS serves on curriculum committee
- LM staff meet at building level

Collaboration

- LMS identifies materials for teachers
- LMS teaches information literacy to students
- LMS provides in-service training to teachers

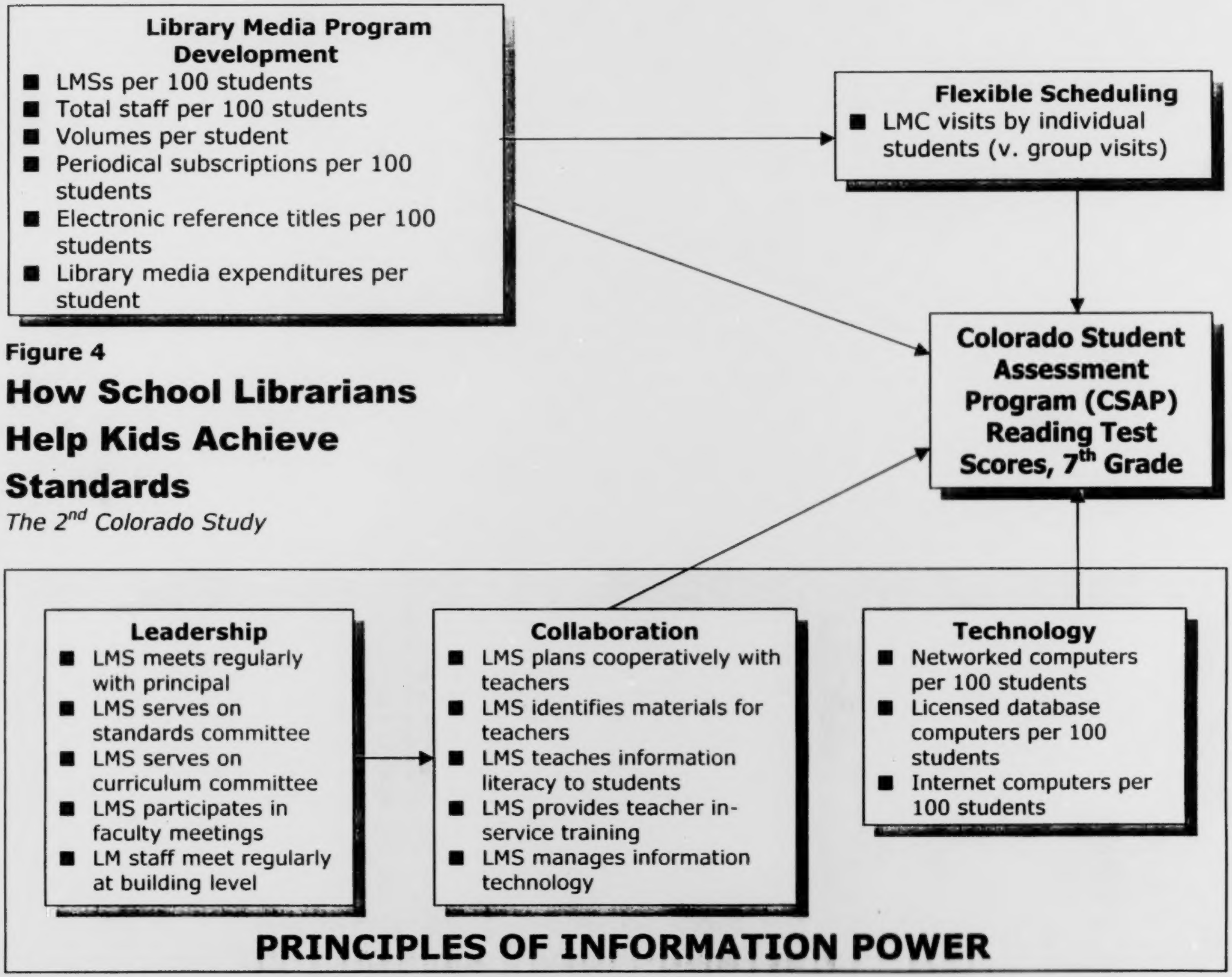
Technology

- Networked computers per 100 students
- Licensed database computers per 100 students

Colorado Student Assessment Program (CSAP) Reading Test Scores, Grades 3 & 4

Library Media Program Development

- Total staff per 100 students
- Volumes per student
- Periodical subscriptions per 100 students
- Library media expenditures per student



Library Media Program Development
- LMSs per 100 students
- Total staff per 100 students
- Volumes per student
- Periodical subscriptions per 100 students
- Electronic reference titles per 100 students
- Library media expenditures per student

Flexible Scheduling
- LMC visits by individual students (v. group visits)

Colorado Student Assessment Program (CSAP) Reading Test Scores, 7th Grade

Figure 4

How School Librarians Help Kids Achieve Standards

The 2nd Colorado Study

Leadership
- LMS meets regularly with principal
- LMS serves on standards committee
- LMS serves on curriculum committee
- LMS participates in faculty meetings
- LM staff meet regularly at building level

Collaboration
- LMS plans cooperatively with teachers
- LMS identifies materials for teachers
- LMS teaches information literacy to students
- LMS provides teacher in-service training
- LMS manages information technology

Technology
- Networked computers per 100 students
- Licensed database computers per 100 students
- Internet computers per 100 students

PRINCIPLES OF INFORMATION POWER

Proof of the Power

A First Look at the Results of the Latest Colorado Study … and More!

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Outline

- What states involved
- The Information Power model, previous research & why further research is needed
- Samples & data used
- **State-by-state report**
- **Key common findings**
- **Distinguishing results**
- **Controlling for school & community differences**
- Recommended actions for schools
- Other research questions
- What you can do

The Latest Statewide Studies

- **Alaska (9/99)**
  - *Information Empowered: The School Librarian as an Agent of Academic Achievement in Alaska*
- **Pennsylvania (12/99)**
  - *Measuring Up to Standards: The Role of School Libraries & Information Literacy*
- **Colorado (3/00)**
  - *How School Librarians Help Kids Achieve Standards (Colorado II)*

Information Power Model

American Association of School Librarians

- **Collaboration, Leadership & Technology**
  - Learning & Teaching
  - Information Access & Delivery
  - Program Administration

Successor to earlier Information Power and, more recently, Library Power (DeWitt Wallace-Readers Digest Fund)

Previous Research Findings

- **Learning & Teaching**
  - LMS as part of planning/teaching team
  - LMS as class instructor
  - 1-1 work of LMS with student (re: flexible scheduling)

NOTE: Integration of information literacy into content standards

Previous Research Findings

- **Information Access & Delivery**
  - Quality collection of books & other materials selected to support curriculum & used by teachers and students
  - State of the art technology integrated into the learning/ teaching & information-seeking processes
  - Cooperation with other libraries, especially public libraries

Previous Research Findings

- **Program Administration**
  - Programs staffed to play integral role (minimally 1 LMS, preferably with aide)
  - Trained LMS (v. special assignment teacher or aide alone)
  - Importance of teacher and principal support
  - Information technology
  - Adequate budget

Motivations for Further Research

- **Confirmation of original Colorado study findings …**
  - with standards-based tests
  - over time
  - in other states
- **Expansion of study to demonstrate value of …**
  - specific activities that define LMS role
  - principal & teacher support
  - flexible scheduling
  - technology as part of LM programs

Samples

- **Alaska**
  - 211 of 461 (46%) schools serving grades 4, 8/11
- **Pennsylvania**
  - 435 (500, 87%) of 1,691 schools serving grades 5, 8 & 11
- **Colorado**
  - 200 (300, 67%) of 1,178 schools serving grades 4 & 7

School Library Surveys

- Staffing
- Staff Activities
- Collection
- Usage
- Technology

Available Data

- **Reading Test Scores**
  (various grades)
- **Community**
  - Adult educational attainment
  - Income/poverty
  - Race/ethnicity
- **School**
  - Teacher-pupil ratio
  - Teacher characteristics (degrees, experience, salary)
  - School lunch students (poverty)
  - Students by race/ethnicity

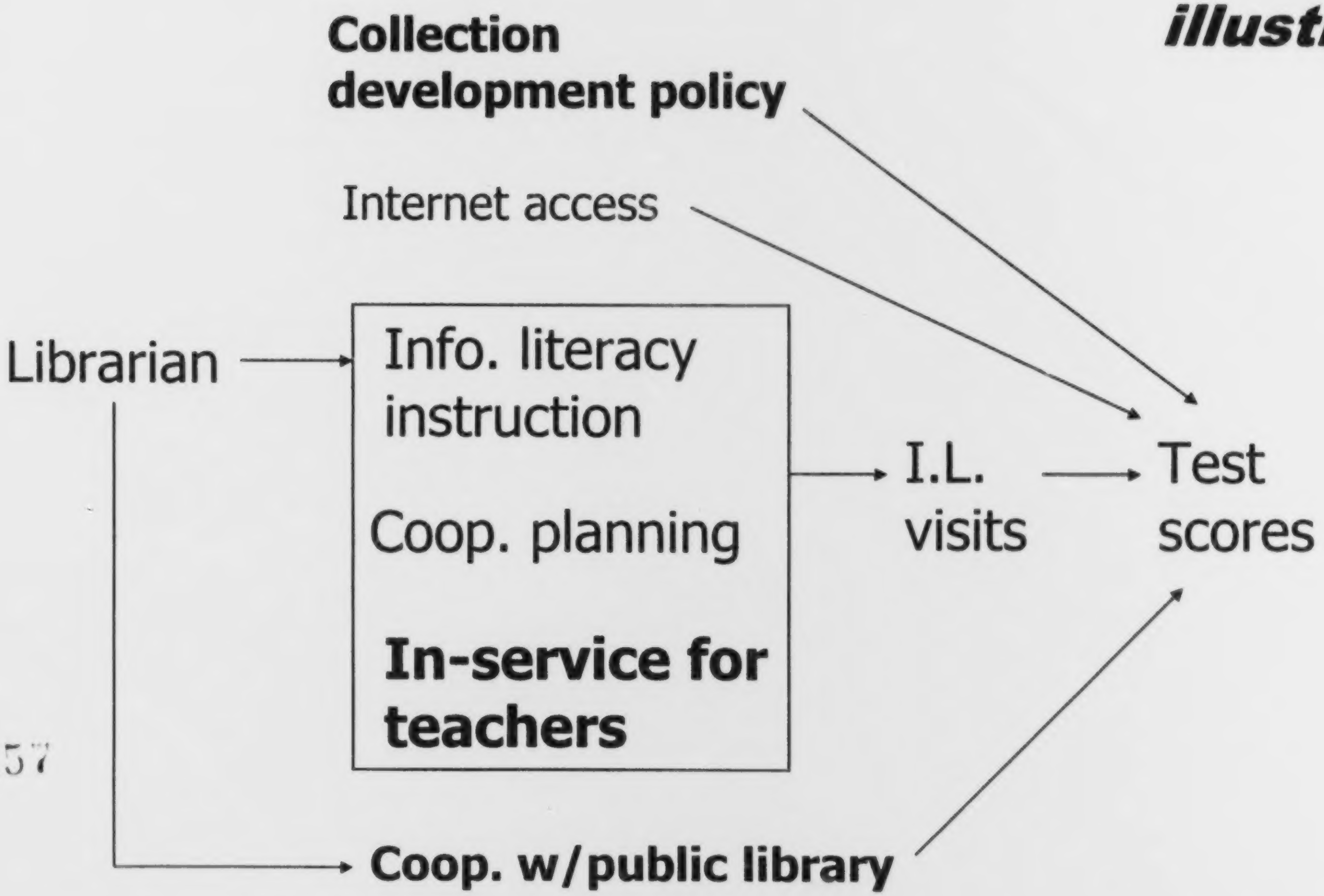
Successful Types of Library Media Predictors

- Level of LM program development (staff, collections, expenditures)
- Staff activities related to cooperation, leadership & technology
- Usage
- Technology

Key Findings
Alaska

- Focus on librarian staffing
- Time spent …
  - delivering information literacy instruction to students
  - planning cooperatively with teachers
  - providing in-service training to teachers
- Collection development policy
- Internet connectivity potential
- Relationship with public library

Key Findings
Alaska
illustrated



Collection development policy

Internet access

Librarian

Info. literacy instruction

Coop. planning

In-service for teachers

I.L. visits

Test scores

Coop. w/public library

Key Findings
Pennsylvania

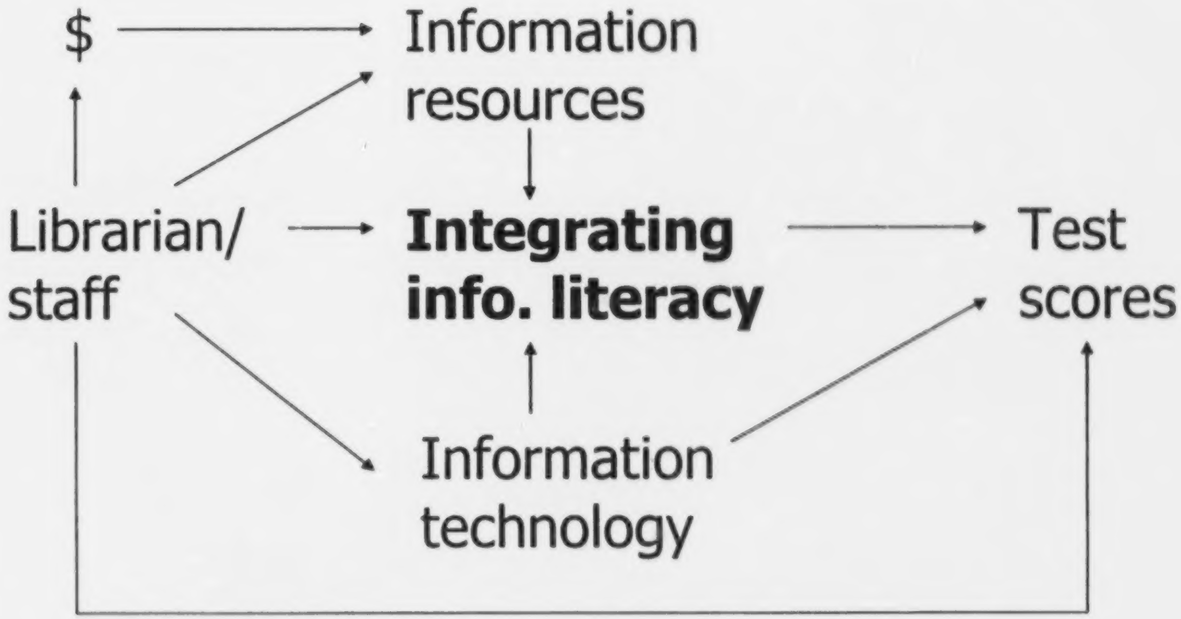
- Librarian plus support staff
- Library expenditures
- Information resources (books, subscriptions, Access PA, other databases)
- Technology (LMC-classroom network)
- Information literacy--integrated with standards & curriculum

Key Findings Pennsylvania

Integrating Information Literacy

- Teaching cooperatively with teachers
- Teaching information literacy to students independently
- Providing in-service training to teachers
- Serving on standards committee
- Serving on curriculum committee
- Managing information technology (i.e., LMC-classroom network)

Key Findings Pennsylvania *illustrated*



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Information resources

Librarian/ staff

Integrating info. literacy

Test scores

Information technology

Key Findings
Colorado

- **Library media program development**
  - professional & total staffing ratios
  - volumes per student, print & electronic subscriptions per 100 students
  - LM expenditures per student

Key Findings
Colorado

- **Leadership**
  - LMS meets regularly with principal
  - LMS participates in faculty, standards & curriculum committees
  - LM staff meets regularly at local & district levels--and beyond

Key Findings
Colorado

- **Collaboration**
  - – LMS plans cooperatively with teachers
  - – LMS teaches cooperatively with teachers (as well as independently)
  - – LMS provides in-service training to teachers
  - – LMS supports network linking LMC & classrooms

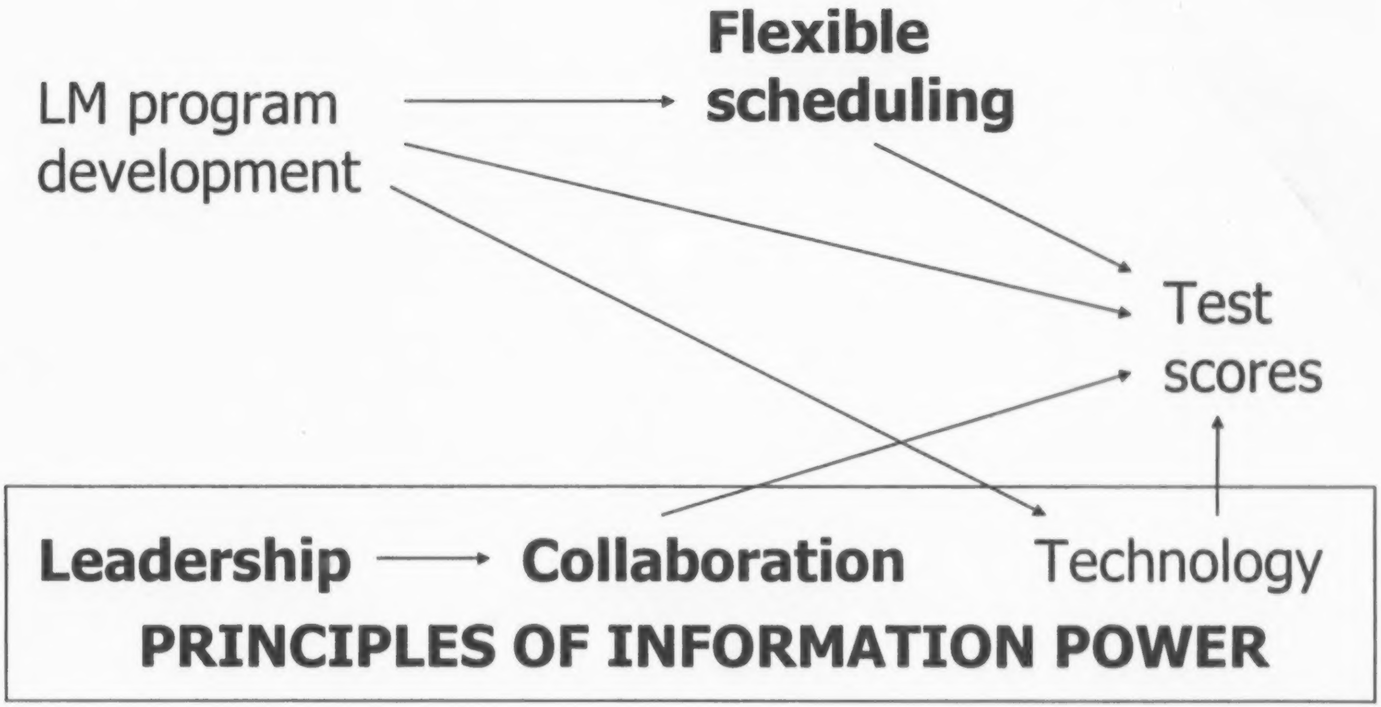
Key Findings
Colorado

- **Technology**

  (Network linking LMC & classrooms)
  - Computers per 100 students
  - Licensed database computers per 100 students
  - Internet computers per 100 students
- **Flexible Scheduling**
  - LMC visits by individual students

    (v. group visits)

Key Findings Colorado *illustrated*



LM program development

Flexible scheduling

Test scores

Leadership → **Collaboration** Technology

PRINCIPLES OF INFORMATION POWER

Key Common Findings

- School library media specialists can & do make a difference.
- The support & cooperation of principals & teachers is essential.
- They need support staff who free them to be involved in teaching/learning as pivotal players.
- LMSs have a teaching role--both as co-teachers of information literacy to students and as in-service trainers of teachers.
- Successful programs extend library & information services and information literacy beyond the LMC walls.

Distinguishing Results

- **Alaska**
  - LMS as in-service training provider (not only, but 1st)
  - LMS as information literacy teacher
- **Pennsylvania**
  - Synergy of LM staff, collections & technology with integrated, collaborative approach to teaching information literacy
- **Colorado**
  - Relationship between leadership & collaboration (apart from LM development issues)
  - Linking flexible scheduling to scores

Controlling for School Differences

- Effects of library media programs **not** explained away by
  - Teacher-pupil ratio
  - Teacher or student characteristics
  - Per pupil expenditures

Controlling for Community Differences

- Effects of library media programs **not** explained away by
    - adult educational attainment
    - income differences (poverty)
    - race/ethnicity

Recommended Actions by Schools

- LM program that is funded to provide adequate professional & support staff, information resources & information technology
- Administrative recognition & support of LMS as a pivotal professional player in the teaching/learning community
- Flexible scheduling
- High-quality licensed databases as well as Internet access
- Classroom & lab computers networked to LM resources

Other Research Questions

- Identifying successful models for developing LMSs' leadership skills
- Exploring relationships of LMSs with principals, teachers, parents & students --and their impact on achievement
- Examining interaction of LMSs, teachers & students via technology

For More Information

- Watch the Library Research Service web site, www.lrs.org
- Contact sponsoring state libraries (AK, CO, PA) for individual state reports
- State & national publications (e.g., forthcoming article in Colorado Libraries on AK results)
- … and … eventually ... another commercially published book
- In the meantime, booking conference sessions and workshops

What You Can Do for Library Media Research

- Respond as completely, accurately & quickly as possible to appeals from researchers
- If there isn't an annual statistical survey of LM programs in your state … go home & get busy!
- Share stories that illustrate these findings